Biological Assessment for the Re-Initiation of Consultation regarding the Proposed Military Relocation to Guam

Prepared by:

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Prepared for:

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Submitted to:

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Acronyms and Abbreviations

ac	acre(s)
AAFB	Andersen Air Force Base
ACE	Air Combat Element
AFB	Air Force Base
AMC	Air Mobility Campus
APHIS	Animal and Plant Health Inspection Service
BA	Biological Assessment
BEQ	Bachelor Enlisted Quarters
BOQ	Bachelor Officer Quarters
BMP	Best Management Practice
BO	Biological Opinion
BTS	brown treesnake(s)
C	Construction
CATM	Combat Arms Training and Maintenance
CFR	Code of Federal Regulations
CLB	Combat Logistics Battalion
cm	centimeter(s)
CNMI	Commonwealth of the Northern Mariana Islands
COMNAV	Commander Navy Region
COMNAVMAR	Commander Navy Region Marianas
CWCS	Comprehensive Wildlife Conservation Strategy
DAWR	Guam Department of Aquatic and Wildlife Resources
Dbh	diameter breast height
dBs	decibels
DFW	CNMI Division of Fish and Wildlife
DNL	day-night average sound level
DoD	Department of Defense
DON	Department of the Navy
DSEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENCL	Enclosure
EOD	Explosive Ordnance Detachment
ERA	Ecological Reserve Area
ESA	Endangered Species Act
ESB	Engineer Support Battalion
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
ft	foot/feet
ft^2	square foot/feet
FY	fiscal year
g	gram(s)
GIS	Geographic Information Systems
GovGuam	Government of Guam
GNWR	Guam National Wildlife Refuge
GWA	Guam Water Authority
HACCP	Hazard Analysis and Critical Control Point
ha	hectare(s)
HG	Hand Grenade
HMU	Habitat Management Unit
HQ	Headquarters
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
ISR	Intelligence, Surveillance, and Reconnaissance
JGPO	Joint Guam Program Office
JRM	Joint Region Marianas
KD	known distance
km	kilometer(s)
km^2	square kilometer(s)
kV	kilovolt
lb	pound(s)
LFTRC	Live-Fire Training Range Complex
m	meter(s)
m^2	square meter(s)
mm	millimeter(s)
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
MIRC	Mariana Islands Range Complex
MLLW	mean lower low water
MOA	Memorandum of Agreement
MPMG	Multi-Purpose Machine Gun
MSA	Munitions Storage Area
MWDK	Military Working Dog Kennel
NAVFAC	Naval Facilities Engineering Command
NBG	Naval Base Guam
NCTS	Naval Computer and Telecommunication Site
NDAA	National Defense Authorization Act
NDWWTP	Northern District Wastewater Treatment Plant
NISC	National Invasive Species Council
NMFS	National Marine Fisheries Service
NMS	Naval Munitions Site
NPDES	National Pollutant Discharge Elimination System
NSSA	Non-standard Small Arms
NWF	Northwest Field
NWRC	National Wildlife Research Center
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Chief of Naval Operations Instruction
Ops	operations
oz	ounce(s)
PCE	Primary Constituent Elements
PCS	Permanent Change of Station
POV	privately-owned vehicle
PSA	Public Service Announcement
ROD	Record of Decision
RBP	Regional Biosecurity Plan
SCC	Security Consultative Committee
SEIS	Supplemental Environmental Impact Statement
SDZ	Surface Danger Zone
SOGCN	Species of Greatest Conation Need
UDP	Unit Deployment Program
U&SI	Utilities and Site Improvements
UoG	University of Guam
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
yd	

EXECUTIVE SUMMARY

On September 8, 2010, the United States Fish and Wildlife Service (USFWS) issued its Biological Opinion (BO) (2010-F-0122) for the relocation of certain elements of the U.S. Marine Corps (USMC) from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The BO addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ''Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,'' dated July 2010. A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010). The 2010 ROD deferred a decision on the location of a live-fire training range complex (LFTRC).

The Department of the Navy (DON) made adjustments with regards to the LFTRC and initially elected to prepare a Supplemental Environmental Impact Statement (SEIS) limited solely to the evaluation of impacts associated with the location, construction, and operation of the LFTRC (77 FR 6787, February 9, 2012). However, on April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap (Ministry of Foreign Affairs 2012). In accordance with the SCC's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam. That decision prompted the DON's review of the actions previously planned for Guam and approved in the ROD and addressed in the BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing areas, could significantly change as a result of the modified force. The DON has opted to address these changes in a Supplemental Environmental Impact Statement (SEIS) (77 FR 61746, October 11, 2012) and this Biological Assessment (BA). The BA addresses the DON's preferred alternative in the SEIS which is to build and operate a main cantonment at Finegayan, housing on Andersen Air Force Base (AAFB), and a live fire training range complex at AAFB, Northwest Field (NWF).

The proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the 2010 ROD. The potential environmental effects of these actions were fully and accurately considered and analyzed in the 2010 FEIS. For example, the relocation of the Marine Corps Aviation Combat Element facilities to AAFB, the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South and Naval Munitions Site (NMS) remain unaffected by the changes in force structure resulting from the 2012 Roadmap adjustments. These actions will occur no matter where on Guam the main cantonment, family housing areas and live-fire training range complex are situated. For those decisions that are not affected by the new force structure, the 2010 ROD stands as the final agency action for those elements.

The expanded scope of the SEIS does not include the transient aircraft carrier berthing in Apra Harbor, the establishment of training ranges on Tinian, and the Army Air and Missile Defense Task Force.

This BA is comprehensive and addresses all actions associated with the USMC relocation to Guam. The DON has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from the actions addressed in the SEIS and DON actions addressed in the ROD that are not affected by the new force structure.

Based on the evaluation presented in this BA, the DON has made the following determinations (Table ES-1).

Table ES-1. Threatened and Endangered Species Addressed in this BA and Their Affects Determinations

Common Name	Scientific Name	ESA Status	Affects Determination	Critical Habitat
Mariana fruit bat	Pteropus mariannus mariannus	Threatened	Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Mariana crow	Corvus kubaryi	Endangered	Likely to Adversely Affect (habitat only)	May Affect, Not Likely to Adversely Affect
Guam rail	Gallirallus owstoni	Endangered	Likely to Adversely Affect (habitat only)	Not applicable
Guam Micronesian kingfisher	Todiramphus [=Halcyon] cinnamominus cinnamominus	Endangered	Likely to Adversely Affect (habitat only)	May Affect, Not Likely to Adversely Affect
Green sea turtle	Chelonia mydas	Threatened	May Affect, Not Likely to Adversely Affect	Not applicable
Hawksbill sea turtle	Eretmochelys imbricata	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Hayun lagu	Serianthes nelsonii	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Mariana gray swiftlet	Aerodramus vanikorensis bartschi	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable

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CHAPTER 1
INTRODUCTION

On September 8, 2010, the USFWS issued its Biological Opinion (BO) (2010-F-0122) for the Joint Guam Program Office (JGPO) Relocation of the USMC from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The BO addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ''Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,'' dated July 2010.

A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010) in which the Department of the Navy (DON) deferred a decision on the location of a live-fire training range complex (LFTRC). In the months following the issuance of the ROD, the DON made adjustments with regards to the LFTRC, including application of a probabilistic methodology for determining firing range surface danger zones that reduced the overall footprint of the Multi-Purpose Machine Gun (MPMG) range. The DON initially elected to prepare a Supplemental Environmental Impact Statement (SEIS) limited solely to the evaluation of impacts associated with the location, construction, and operation of the LFTRC (77 FR 6787, February 9, 2012). However, on April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam (Figure 1-1). That decision prompted the DON's review of the major actions previously planned for Guam and approved in the 2010 ROD and addressed in the 2010 BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing area, could significantly change as a result of the modified force (Figure 1-1). The DON has opted to address these changes in an SEIS (77 FR 61746, October 11, 2012) and this Biological Assessment (BA). This BA addresses the DON's preferred alternative which is to build and operate a main cantonment at Finegayan, family housing at Andersen Air Force Base (AAFB) and a live fire training complex range at AAFB, Northwest Field (NWF) (Table 1-1).

As discussed above, the proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the ROD. The relocation of the USMC Aviation Combat Element facilities to AAFB, the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South and NMS remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments (Table 1-1). These actions will occur no matter where on Guam the main cantonment, family housing and LFTRC are situated. The potential environmental effects of these actions were fully and accurately considered and analyzed in the FEIS. For those decisions that are not affected by the new force structure, the 2010 ROD stands as the final agency action for those elements.

The scope of the SEIS does not include the transient aircraft carrier berthing in Apra Harbor, the establishment of training ranges on Tinian, and the Army Air and Missile Defense Task Force.

This BA is comprehensive and addresses all actions associated with the USMC relocation to Guam.

Figure 1-1. Key Differences Between 2010 Final EIS and 2014 Draft SEIS

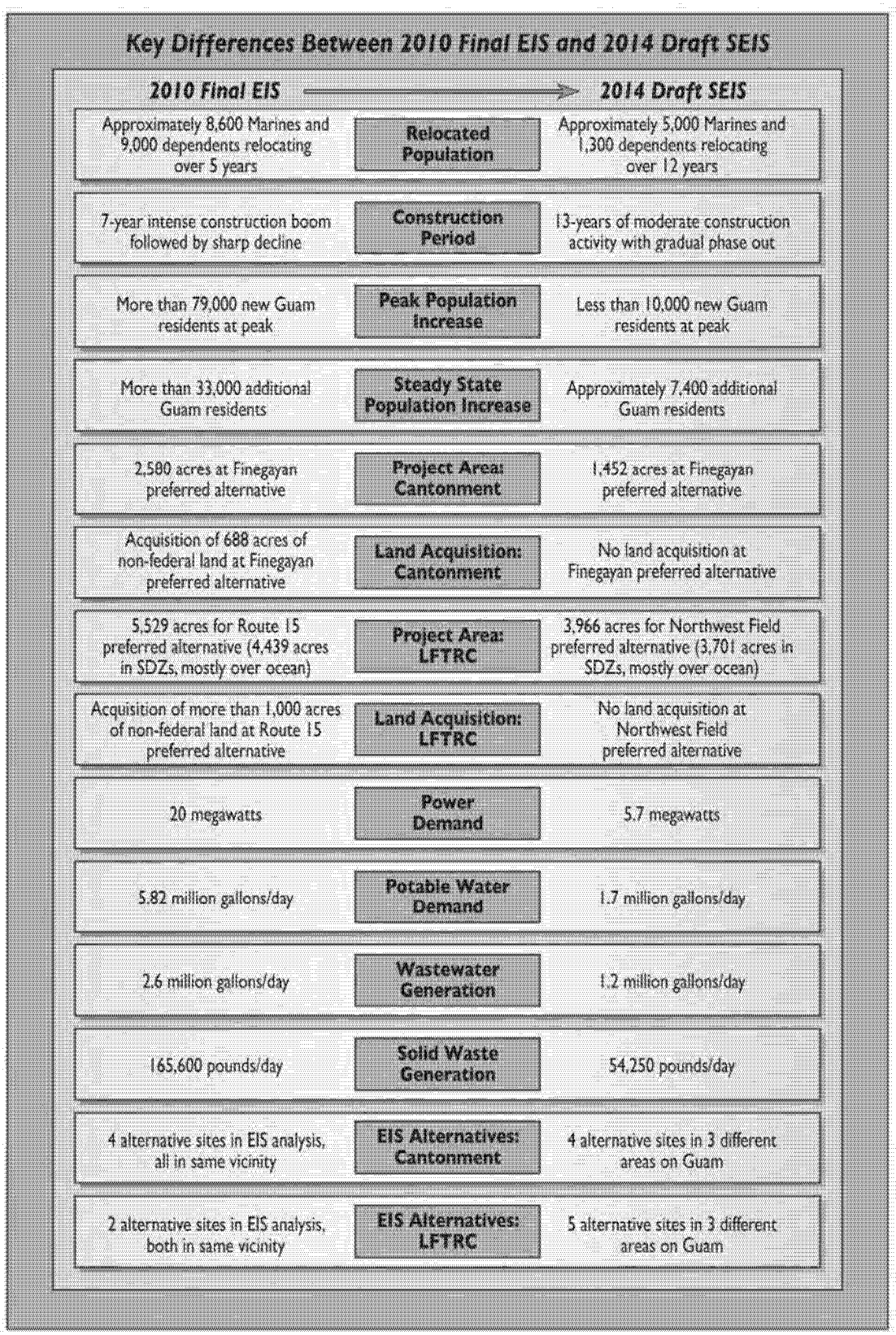

Table 1-1. DON Actions Associated with the Military Relocation to Guam

Location	Action (Status)
Finegayan	Utilities and Site Improvements (U&SI), Phase I – Main cantonment
Finegayan	Utilities and Site Improvements (U&SI), Phase II - Main cantonment
AAFB	Family Housing
Northwest Field (NWF)	Live-Fire Training Range Complex - KD ranges
NWF	Live-Fire Training Range Complex - MPMG range
Andersen South	Hand Grenade Range
Finegayan, other existing bases, NWF, and Andersen South	Information Technology/Communications
AAFB	Well Field and Associated AAFB Distribution System
Route 3, 3A and 9	Off-Base Utilities (Water, Sewer and Electrical)
AAFB	Location for the Marine Corps Air Combat Element and construction of associated facilities at AAFB North Ramp (Parking Apron and Utilities Under Construction)
AAFB	Construction of air embarkation facilities at AAFB South Ramp (Air Freight Terminal Complex Under Construction)
AAFB	Construction of the North Gate and access road at AAFB, including a new Entry Control Point facility (Under Construction)
Andersen South	Development of a training range complex to include maneuver training and landing zones (Under Design)
Apra Harbor	Waterfront functions at Apra Harbor to support embarkation, including wharf and utility upgrades, and associated berth dredging and dredge disposal management (Uniform and Tango Wharf Improvements and Apra Harbor U&SI Under Construction)
Apra Harbor	Relocation of Military Working Dog Kennel (Under Construction)
Apra Harbor	Relocation of U.S. Coast Guard (Future Project)
Apra Harbor	New Medical Clinic (Future Project)
Apra Harbor	Apra Harbor Embark Operations (Future Project)
Naval Munitions Site	Training activities, including aviation training and nonfiring operations training (Future Project)
Naval Munitions Site	Access to the NAVMAG area using the existing hiking trail as the access road (No Construction Required)
Naval Munitions Site	Use of Parsons Road area for the location of additional ammunition storage at NAVMAG (Future Project)
Utility Projects	Installation of disinfection and treatment water system, water tank, booster pumps, emergency generator, and transmission facilities required to provide potable water supply. Well Repair project proposes to restore the well facilities back into service to support the immediate water demand from the military build-up. (Completed)
Roadway Project (by FHWA and Guam Department of Public Works[GDPW])	Route 1 and Route 8 intersection and improvement (Hagåtña) ("Guam Road Network" [GRN]1) – (Part of Hagåtña Bridge Replacement Project Scope, Under Construction)
Roadway Project(s)	Route 1 and Route 3 intersection and roadway improvements (Dededo) (GRN2) – (On Hold)
Roadway Project	Replacement of Hagåtña (Agaña) Bridge #1 with reinforced concrete (GRN3) – (Under Construction)
Roadway Project	Route 11 roadway improvements from the port to Route 1, including pavement strengthening (GRN4) – (Completed)
Roadway Project	Widening of the Route 1 and Route 11 intersection, adding a second left turn lane and pavement strengthening (GRN5) – (Completed)

FSEIS 2014 Preferred Alternative
2010 ROD Retained Actions

1.1 BACKGROUND

The 2010 BO concluded that after reviewing the current status of the listed species, the environmental baseline, the effects of the Proposed Action and the cumulative effects, the action, as proposed, was not likely to jeopardize the continued existence of the Guam Micronesian kingfisher, Guam rail, Mariana common moorhen, Mariana crow, and Mariana fruit bat.

The 2010 BO anticipated incidental take may occur to the Mariana common moorhen and the Mariana fruit bat as a result of the Proposed Action. The incidental take was for the following species and actions:

1) Four Mariana common moorhens may be incidentally taken in the form of harassment on days when construction and live-fire exercises occur at the proposed Tinian firing ranges.
2) Up to ten remaining Mariana fruit bats at the Pati Point natural area colony will be taken in the form of harassment due to loud aircraft noise resulting from the Project Description.

To date, no incidental take associated with the 2010 Project Description has occurred as no work was initiated on Tinian and no loud aircraft noise has occurred due to the delay in the relocation of USMC personnel.

In 2011, the DON requested to amend the 2010 BO to address a reduction in the amount and pace of construction. The USFWS's response recognized the need to delay implementation of certain conservation measures outlined in the BO.

In September of 2012, the DON notified the USFWS of its intention to request a second amendment to the BO due to changes in the overall project description tied to an adjustment of the United States' agreement with Japan and congressionally mandated conditions restricting the DON's ability to expend funds to implement the military relocation to Guam, including those funds necessary to implement various conservation measures. On October 12, 2012, the USFWS stated that a re-initiation request and BA (versus an amendment to the BO) were necessary to address the changes in the project description.

In April of 2013, the DON submitted a BA with the conclusion that the interim actions (i.e., those actions not affected by the 2012 Roadmap Adjustments) were "not likely to adversely affect" the Mariana fruit bat. Consistent with Department of Interior and USFWS published guidance, the DON's request for re-initiation focused only on those extant species currently physically present on Guam and did not include those species extirpated from Guam. While the USFWS acknowledged that current regulations and published USFWS guidance do not specifically address extirpated species, the USFWS advised the DON that consultation on effects to currently extirpated species is not unprecedented and is appropriate in this instance as the effects of the Proposed Action are likely to persist and overlap the period when reintroduction of the currently extirpated species on Guam is reasonably certain to occur and the species are likely to be exposed to the effects of the Proposed Action should it be implemented. Reintroduction of the any of the species on Guam will require the USFWS to develop a reintroduction plan and comply with the legal requirements of the National Environmental Policy Act and the Endangered Species Act. The DON will actively participate in recovery committees for endangered or threatened species on Guam and in the Marianas, and will work with the USFWS to develop a reintroduction plan and associated environmental planning and compliance documentation that ensures such reintroduction efforts are consistent with the species recovery plans and recognizes the long-term military mission on Guam.

Due to the amount of time it took to resolve the issues regarding extirpated species, the DON rescinded the 2013 BA and has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from the actions addressed in the Final SEIS and the DON actions addressed in the ROD that are not affected by the April 2012 SCC joint statement.

On September 10, 2013, in anticipation of the Section 7 consultation for the SEIS, the DON sent a request to the USFWS for concurrence on the list of federally listed species and designated critical habitat present within the U.S. Territory of Guam. The USFWS responded on September 20, 2013 with a species list (Table 1-2). The DON has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS for all the DON actions associated with the USMC relocation to Guam (Table 1-3).

Table 1-2. USFWS Species List for the Guam and Commonwealth of the Northern Marianas Islands (Tinian) Military Relocation

Common Name	Scientific Name	ESA Listing Status	Islands
Hayun lagu	*Serianthes nelsonii*	Endangered	Guam
Mariana fruit bat*	*Pteropus mariannus mariannus*	Threatened	Guam, Tinian
Mariana crow*	*Corvus kubaryi*	Endangered	Guam[1]
Mariana common moorhen	*Gallinula chloropus guami*	Endangered	Guam, Tinian
Guam rail	*Gallirallus owstoni*	Endangered	Guam[1]
Micronesian megapode	*Megapodius laperouse*	Endangered	Tinian
Guam Micronesian kingfisher*	*Todiramphus cinnamominus cinnamominus*	Endangered	Guam[1]
Mariana gray swiftlet	*Aerodramus vanikorensis bartschi*	Endangered	Guam
Green sea turtle[2]	*Chelonia mydas*	Threatened	Guam, Tinian
Hawksbill sea turtle[2]	*Eretmochelys imbricate*	Endangered	Guam, Tinian

*Critical habitat for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher has been designated on the Guam National Wildlife Refuge.
[1]Extirpated in the wild on Guam. Sufficient habitat is needed for recovery which includes the re-establishment of these species in the wild on Guam.
[2]Only includes species utilizing terrestrial resources (e.g., turtle nesting on beaches).

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action in the SEIS is to ensure that the relocated Marines are organized, trained, and equipped as mandated by 10 USC §5063 to satisfy individual live-fire training requirements as described in the 2010 Final EIS and associated ROD, and to establish an operational USMC presence on Guam in accordance with the 2012 Roadmap Adjustments. The purpose remains unchanged from the 2010 Final EIS, albeit to support a materially smaller relocating USMC force (Figure 1-1).

For a more detailed discussion of the purpose of and need for the Proposed Action, please refer to the:

- 2010 FEIS, Chapter 1, Volume 1 (Overview of Proposed Action and Alternatives); and

- 2014 Final SEIS, Chapter 1 - Purpose of and Need for the Proposed Action

After receipt of several regulatory agency and public comments on the Draft SEIS requesting the DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally-listed threatened and endangered species on Guam, the DON has decided to create an alternative that moves the preferred housing location from Finegayan to AAFB. This change reduces the impacts to recovery habitat for the Mariana crow, Guam Micronesian kingfisher and Mariana fruit bat by approximately 305 acres. The new alternative, which the DON has identified as its preferred alternative in the SEIS, is essentially a combination of the main cantonment already analyzed under Alternative B and the family housing analyzed under Alternative D in the Draft SEIS. This new alternative, Alternative E, is comprised of the main cantonment at Finegayan, family housing at AAFB, and the LFTRC at AAFB-NWF. This new preferred alternative will be identified as such and analyzed in the Final SEIS. The purpose and need and core description of the Proposed Action has not changed.

1.3 SPECIES ADDRESSED IN THIS BA

Section 7(a)(2) of the Endangered Species Act (ESA) states, "Each Federal agency shall, in consultation with and with the assistance of the Secretary of the Interior, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species." To "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. [50 CFR §402.02]

The threatened, endangered or extirpated species that may be within the Action Area of the actions covered in the scope of this BA are listed below in Table 1-3.

Table 1-3. Species Addressed in the BA

Common Name	Scientific Name	ESA Listing Status
Hayun lagu	*Serianthes nelsonii*	Endangered
Mariana fruit bat	*Pteropus mariannus mariannus*	Threatened
Mariana crow[1]	*Corvus kubaryi*	Endangered
Guam rail[1]	*Gallirallus owstoni*	Endangered
Guam Micronesian kingfisher[1]	*Todiramphus cinnamominus cinnamominus*	Endangered
Mariana gray swiftlet	*Aerodramus vanikorensis bartschi*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered

[1]Extirpated in the wild on Guam. Habitat suitable for the recovery of the species is available on Guam.

1.4 SPECIES ELIMINATED FROM DETAILED ANALYSIS

In a September 20, 2013 letter, the USFWS identified 10 species as species "that may be affected by your proposed project." Two of those species have been excluded from analysis within this BA because either: (1) the DON has determined that the revised Project Description will not affect the species or (2) the species are not present in the Action Area (Table 1-4).

Table 1-4. Species Eliminated from Analysis in this Biological Assessment

Common Name	Scientific Name	ESA Listing Status	Islands
Mariana common moorhen	*Gallinula chloropus guami*	Endangered	Guam, Tinian
Micronesian megapode	*Megapodius laperouse*	Endangered	Tinian

The Mariana common moorhen and Micronesian megapode are listed as endangered and occur on Guam and Tinian, however, the DON has determined that the Project Description will not affect these species and they are excluded from analysis within this BA. The DON has reached this conclusion because activities addressed in this BA are not sufficiently proximate to the Mariana common moorhen to directly or indirectly affect any individuals. The Micronesian megapode is excluded from analysis because they are not found within the Action Area, Guam, instead they are found on Tinian. The Action Area no longer includes Tinian.

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CHAPTER 2
PROPOSED ACTION, BEST MANAGEMENT PRACTICES, AND CONSERVATION MEASURES

2.1 PROPOSED ACTION

The SEIS Proposed Action is to construct and operate a main cantonment area, including family housing, and a LFTRC on Guam to support the USMC relocation. These requirements include a main cantonment and family housing area of sufficient size and functional organization to accommodate the reduced number of Marines relocating to Guam per the 2012 Roadmap Adjustments, and an LFTRC that allows for simultaneous use of all of the firing ranges to support training and operations of the relocated Marines. The SEIS Proposed Action also includes the provision of on-site utilities, access roads, and related off-site infrastructure to support the main cantonment, family housing and LFTRC (Figure 2-1 and Table 1-1).

The Proposed Action in this BA includes those decisions that were made in the 2010 ROD that remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments and the Preferred Alternative as described in the 2014 Final SEIS (Figure 2-1). As part of the National Environmental Policy Act environmental planning process, the DON held public meetings to allow for public and regulatory agencies to comment on the Proposed Action. As a result, the DON received comments from both regulatory agencies and the public recommending the DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally-listed threatened and endangered species on Guam. In response to these recommendations, the DON has decided to create an alternative that moves the family housing from Finegayan to AAFB, while maintaining the main cantonment at Finegayan. This new alternative, which the DON has identified as its new preferred alternative, is essentially a combination of the main cantonment already analyzed under Alternative B and the family housing analyzed under Alternative D in the Draft SEIS. This alternative moves the preferred housing location from an undeveloped area to an area that is already developed as family housing, thus avoiding the impacts to the habitat present in the southern portion of Finegayan. Additionally, locating the housing at AAFB will provide the opportunity to share services such as the commissary and exchange, resulting in a long term cost savings to the DoD. The new preferred alternative with the main cantonment at Finegayan and family housing at AAFB will be included in the Final SEIS as Alternative E and is used as the Proposed Action in this BA.

2.2 MILITARY RELOCATION CONSTRUCTION PROJECTS

Implementation of the Proposed Action includes over 130 separate construction projects (Appendix A). The projects include both horizontal construction (e.g., clearing, grading, and utilities) and vertical construction (e.g., building construction). In some instances, the horizontal construction will happen well in advance of the vertical construction.

The approximate acreage of impacts to recovery habitat associated with the various elements of the Proposed Action are calculated in Table 2-1.

Figure 2-1. FEIS Alternative "E" Project Footprint and 2010 ROD Retained Actions

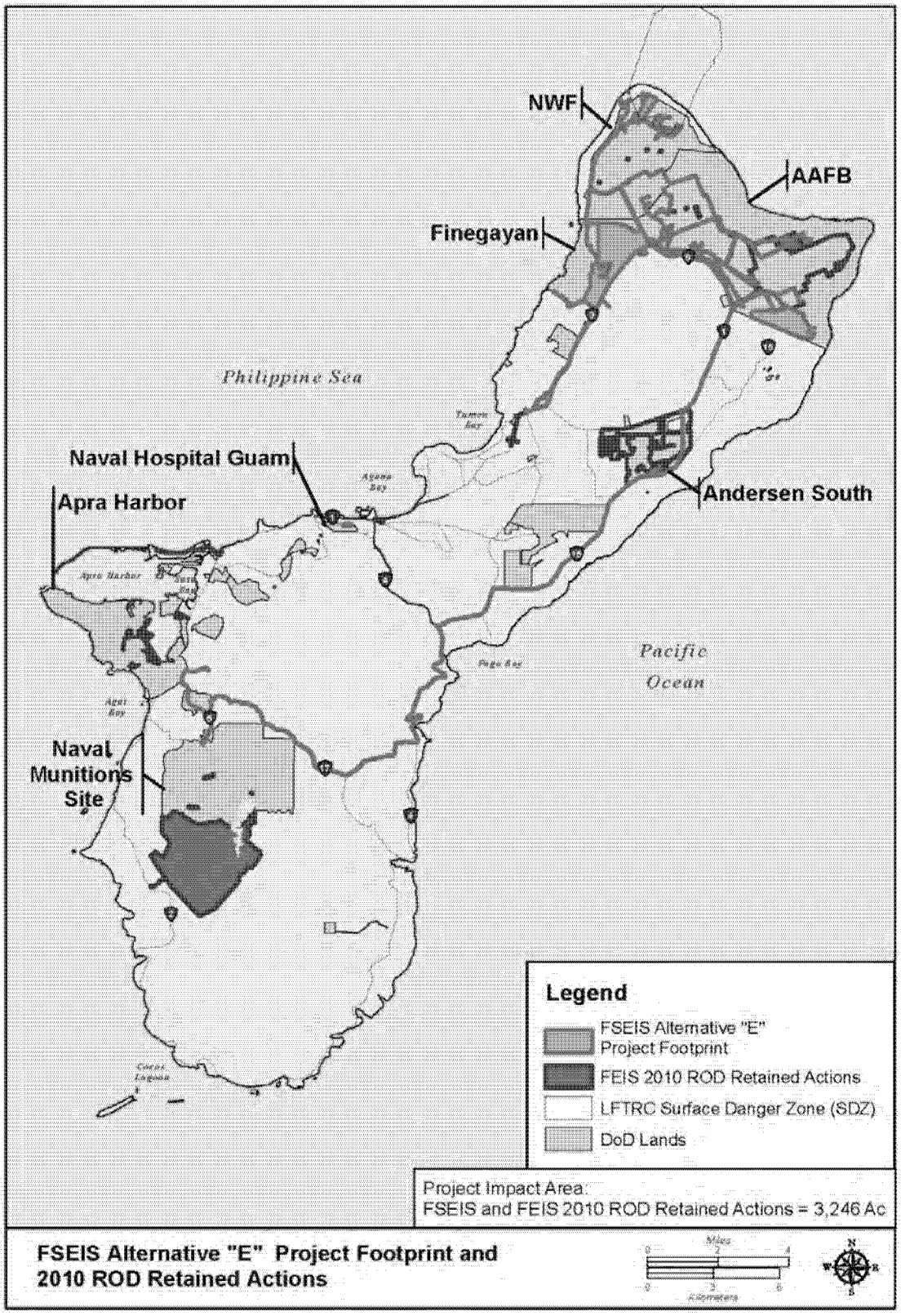


Table 2-1. Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas		Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery
Project Name	Overlap - Project Name				
FEIS 2010 ROD Related Actions		48.40	75.61	382.93	71.84
Cantonment U&SI Phase I		334.52	336.95	192.73	336.95
Cantonment U&SI Phase II		106.84	106.80	66.34	106.80
Family Housing at AAFB		10.84	10.84	39.73	8.18
Information Technology/Communications		18.51	23.66	96.86	23.46
Electrical, Wastewater, and Water Off Site Utilities		18.79	29.94	67.65	28.35
Water Well Development Area		90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG		62.63	80.50	27.05	80.50
Live Fire Training Range Complex - KD Ranges		115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation		2.88	13.04	0.00	14.42
AAFB - Expand Middle School		0.00	0.00	0.00	0.00
Guam High School Expansion		0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects		138.31	197.32	144.42	197.32
Footprints		933	1072	1071	1065

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(2014); Guam Rainbow Chart 3/17/2014
Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90Ac of impact

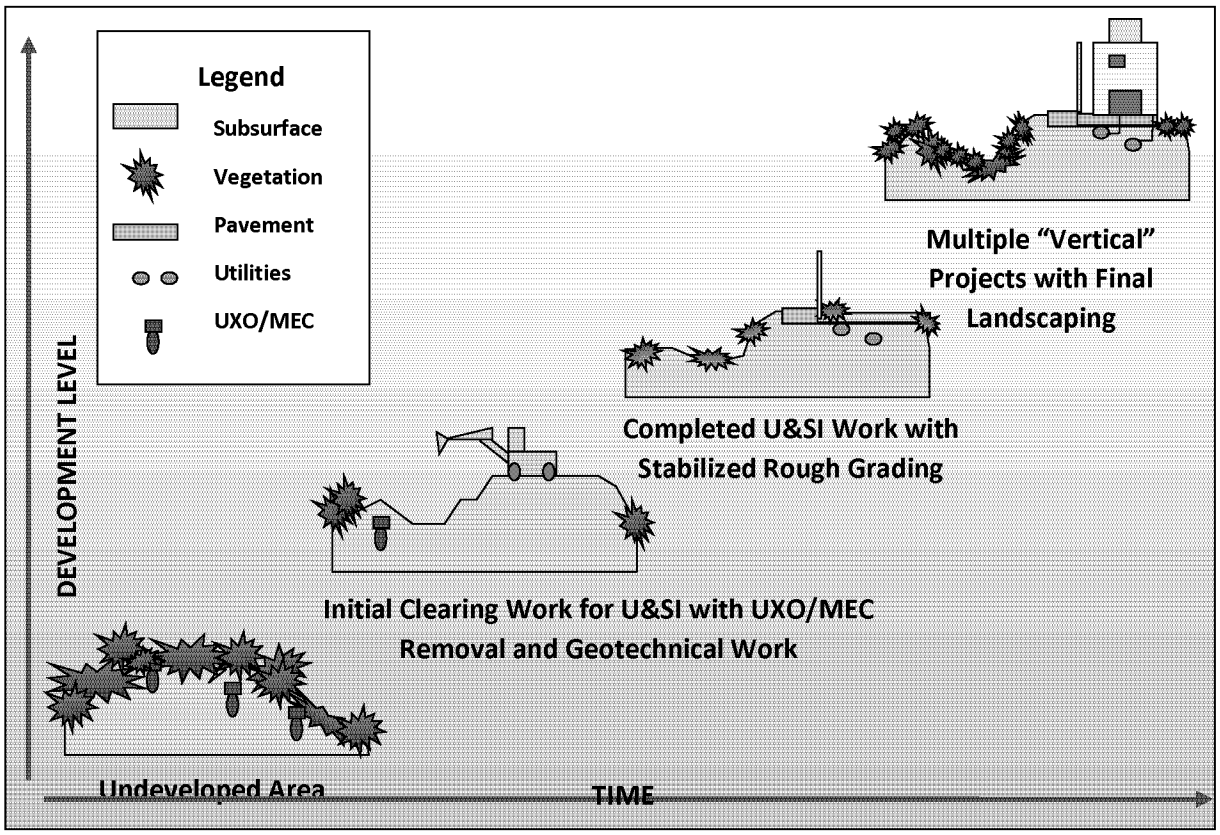
2.2.1 Utilities and Site Improvements (U&SI)

The geographic limits of a development area, particularly the main cantonment and family housing, will coincide with the footprint of horizontal construction work referred to as "Utilities and Site Improvements" (U&SI). Virtually all vegetation clearing and the bulk of ground disturbance are performed during preparatory horizontal construction work (including initial "intrusive" design activities and clearing of unexploded ordnance and munitions and explosives of concern (UXO/MEC)). The U&SI, as its name implies, basically provides the foundation or backbone transportation, utility and ground surface improvements to prepare the area for future vertical construction and tie-in of individual facilities and utilities.

There are three U&SI projects (Phases 1 and 2 of the main cantonment and family housing). Figure 2-2 illustrates the chronology of a large construction project over time, displaying the timing of horizontal and vertical construction.

The U&SI project scope includes clearing, grubbing, grading, earthwork (such as digging, trenching, drilling, boring and/or cut and fill), processing and stockpiling of green waste, erosion and sediment control, roadways, sidewalks, curbs and gutters, traffic signs, temporary construction fence, perimeter/security fence, landscaping and other site improvements. An electrical substation, underground electrical distribution, telecommunications conduit and cabling, mechanical utilities (water transmission main and sanitary sewer) will also be constructed. Additionally, the effort may require removal of MEC, seismic fault, geotechnical/geophysical and/or topographic surveys in preparation for improvements and future construction projects within the area.

Figure 2-2. Phasing of Horizontal (U&SI) and Vertical Work for Large Development Areas



A wastewater collection system including a wastewater pump (lift) stations and manholes would be installed. The new wastewater collection system would be installed underground with a minimum 3 feet (ft) to 5 ft of cover, or sometimes deeper if needed. The width of the installation trench would be approximately 2 ft to 4 ft wide. Larger excavations would be required for the installation of manholes and a wastewater pump station.

The same work to establish interconnectivity to and use of existing utility infrastructure will apply to power transmission and telecommunications infrastructure; it will also require new equipment, transmission and distribution lines, substations and standby power generation. Trench excavations required for all utilities will be similar in depth to wastewater and water lines, but may need adjustments based on conflicts or separation requirements.

Potable water demand will be addressed by additional supply from the proposed AAFB well field and existing DoD water system. The current water system serving existing facilities in Finegayan would generally remain in service. Interconnections between the proposed water system and the existing water system would be provided for redundancy and operational efficiency. Depth of excavations will be similar in nature to the wastewater collection system.

Site Preparation

Clearing and Grubbing: The U&SI projects require removal of vegetation, stripping limestone rock, and removal and stockpiling of reusable topsoil. This site work preparation will occur prior to mass grading of the site.

Grading and Earthwork: The U&SI work includes major earth moving (mass grading) and limited fine grading along the roadway corridors and drainage systems. The cut and fill quantities associated with this mass grading effort assume a rough building pad for future vertical construction, which anticipates further import of structural fill material. The cut and fill quantities also assume a 2 ft deep typical road pavement section including compacted base and pavement surfacing. Grading for clear zone at perimeter security fence is included.

The cut and fill quantities are based on the assumption that native material excavated on site is suitable for reuse as fill material. If soil testing and/or geotechnical recommendations indicate otherwise changes in grading or importation of material may be required. Contractors are required to obtain aggregate/soil from contractors/vendors who have local permits. Imported sand and other quarried products from abroad are subject to inspection by the Guam Department of Agriculture which issues an importation permit. All sand and aggregate material imported must be accompanied by official records indicating chemical composition, pest-free certification, treatment certificate, and certificate of origin. Treatment (disinfection) must be conducted at the point of origin.

Beneficial Reuse and Recycling Facility: Green waste processing and construction and demolition (C&D) debris generated during construction will be handled by contractors at designated laydown areas. Contractors will be required to divert all the green waste and a minimum of 50% of the C&D waste. The larger-sized green waste consisting of trees and stumps will be processed into mulch and the smaller sized green waste will be processed into compost. The C&D debris will mainly consist of concrete that will be crushed and used as lower-graded aggregate. The C&D waste not able to be diverted will be transported to the Naval Base Guam (NBG) Landfill, or to one of the two permitted private hardfill facilities in Yigo (Eddie Cruz and Primos Northern Hardfill).

Fencing

Perimeter Fence: An approximately 8,500 m (27,900 ft) long security fence (the exact length will be determined during design) will be constructed around the main cantonment perimeter. In accordance with Marine Corps Order 5530.1A, a 15 ft wide gravel perimeter road will be constructed on the inside of the fence line, and a 20 ft clear zone will be provided on the outside of the fence line.

Electrical Utilities

Electrical Substation: A main substation equipped with two 15 megavolt ampere, 34.5 kV – 13.8 kV transformers will be constructed in the main cantonment area, south of the main gate. Provisions will be made in the substation for primary line connections to the planned 34.5 kV underground line from the Harmon Substation and to the planned 34.5 kV line from AAFB. Switchgear space for future circuit breakers and empty conduit runs for future connections to the main substation will be provided. This space is to accommodate future connections that may be necessary to support and integrate the existing 13.8 kV critical circuits and existing 4.16 kV non-critical load on Finegayan.

Mechanical Utilities

Water Distribution: A new transmission main, to be installed by the well fields project, will convey water from the well field storage tank at AAFB to the boundary of the main cantonment area near the commercial/tactical vehicle gate. This project will construct a water pipeline from Route 3A near the commercial/tactical vehicle gate to the new two million gallon ground level water storage tank on Finegayan. The existing mains between some of the existing water wells on Finegayan will be demolished and realigned to the proposed roadways. The existing distribution mains servicing the abandoned Building 200 will also be removed. In the short term, the existing Finegayan water wells will

provide the USMC water distribution system with water. The long-term plan will provide the USMC water distribution system with water from both the existing Finegayan wells and the well fields system. This will provide an emergency backup for the water supply at AAFB be taken off line for maintenance or other reasons.

Sanitary Sewer: The existing DoD wastewater collection system within the main cantonment area at the Finegayan site consists of a trunk sewer serving Building 200 and connected to the GWA wastewater collection system through a GWA interceptor sewer along Route 3. Wastewater is conveyed to the Northern District Wastewater Treatment Plant (NDWWTP). Capacity evaluations of the existing collection system indicate the GWA interceptor sewer has adequate capacity for the project. The notional grading for the main cantonment area generally slopes downhill from north to south. A connection to the existing GWA interceptor sewer main along Route 3 is included.

2.2.2 Main Cantonment

The limits of a main cantonment development coincide with the footprint of U&SI horizontal construction work with the following exceptions: 9th Engineer Support Battalion (ESB) Headquarters (HQ) and 9th ESB, recycle/transfer station, utilities distribution/transmission projects external to U&SI PH1, PH2, and family housing (Figures 2-3 and 2-4). These project areas are accounted for in the impact analysis but the clearing and grading will not occur as part of the U&SI work.

The proposed main cantonment development includes essential base operations and support facilities and functions that are divided into the functional categories listed below, followed by examples of buildings/facilities for each. A complete list of base operations and support facilities is included in Appendix A.

1. Command Core - *Marine Expeditionary Brigade Headquarters (MEB HQ) and Command Buildings*

2. Unit Operations – *3rd MEB Command Element, 4th Marines, Ground Combat Element Infantry Battalion 1 and 2 (GCE – Inf Bn#1/2), Artillery Battery, Combat Logistics Battalion [CLB] -4, 9th Engineer Support Battalion (ESB) and Explosive Ordnance Disposal (EOD)*

3. Base Operations – *Base Administration, Fire Station, Public Works, Vehicle Fueling, Base Auto Shop, Kennel, Corrosion Prevention and Control, Security, etc.*

4. Bachelor Enlisted Quarters and Bachelor Officer Quarters (BEQs/BOQs)

5. Community Support – *Dining Facility, Fitness Center, Recreation Areas, Education Center, Auditorium/Theater, Branch Exchange, Bank/Credit Union, Food Court/Amusement Center, Medical/Dental Clinic, Post Office, etc.*

6. Training – *Battle Training Center, Individual Combat Skills Course, etc.*

These categories of main cantonment functions are generally consistent with those previously described in the Proposed Action for the 2010 FEIS Volume 2 Chapter 2.2 and 2010 BO; however, the relative size of the required cantonment area is considerably reduced given the smaller size and adjusted composition of the relocating force (i.e. a reduction from the original plan for approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and 1,300 dependents).

Figure 2-3. Main Cantonment/Family Housing Alternative – FIN/AAFB

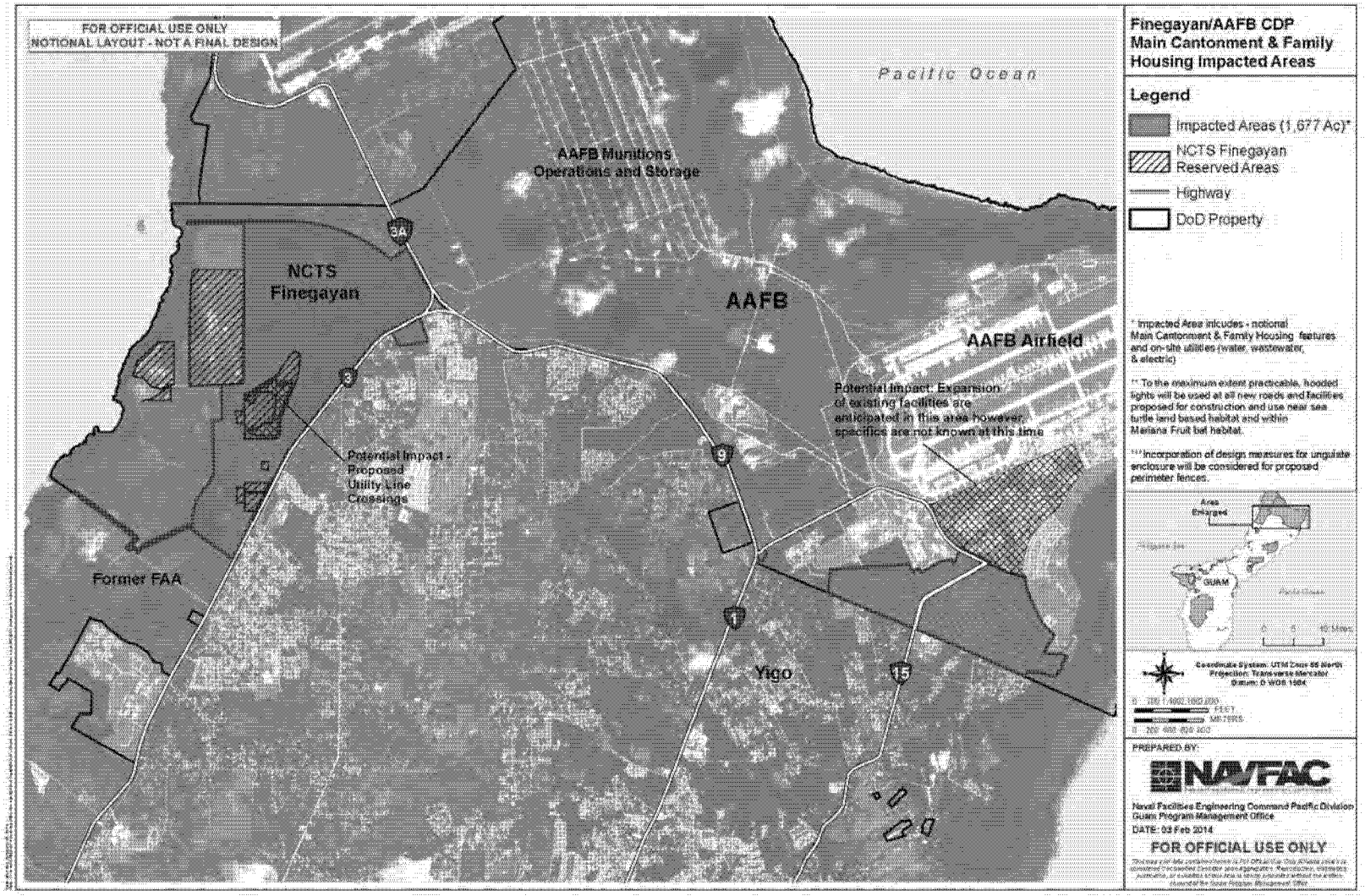
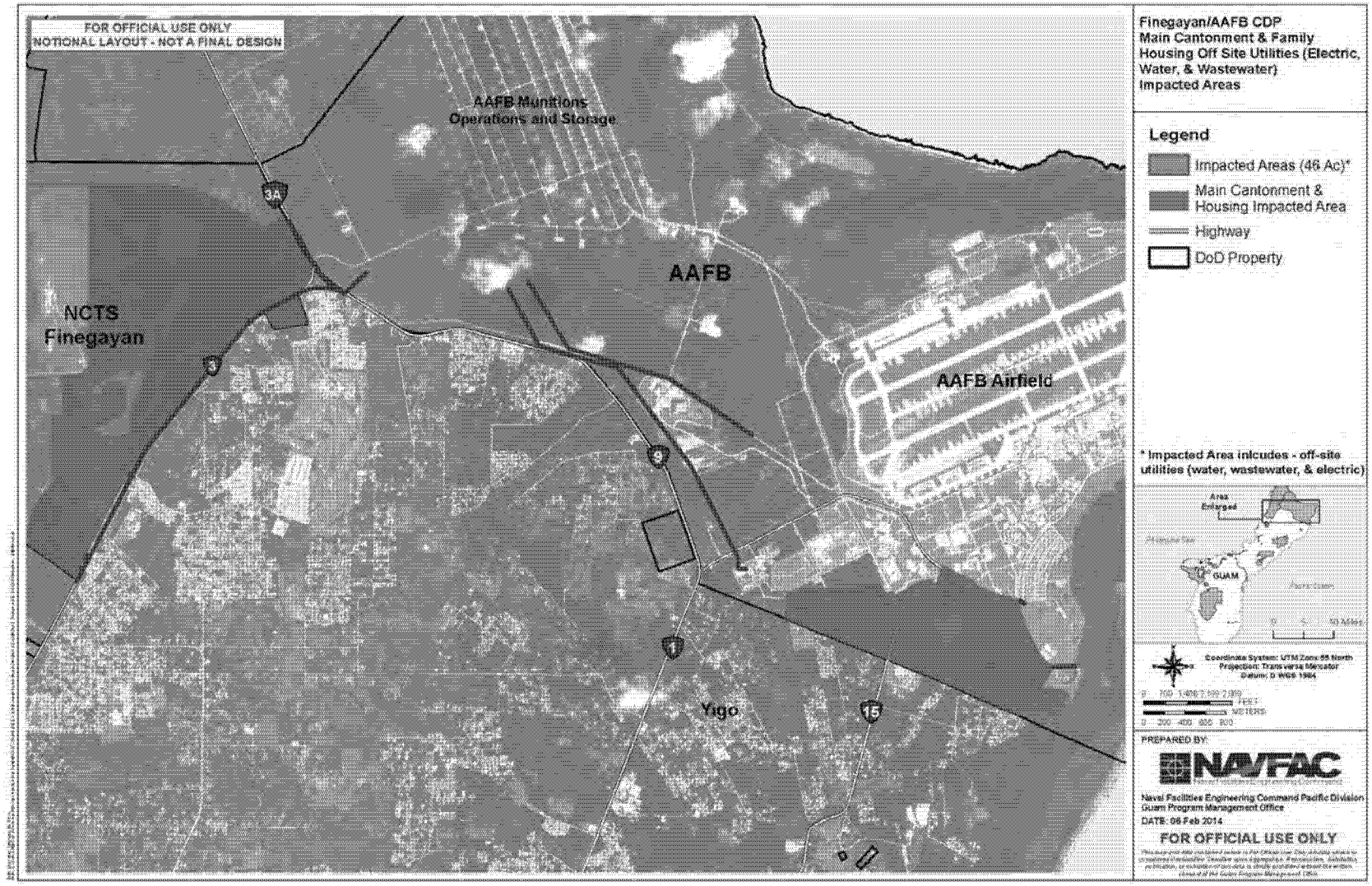


Figure 2-4. Main Cantonment/Family Housing Alternative – FIN/AAFB Utilities



Unit Operations and Base Operations will have the most intensive land use equivalent or similar to activities found in light industrial zoned areas. Activities in the Command Core, BEQ/BOQ, Community Support, and Training functions will have activities that are equivalent to residential or commercial zoned areas.

Individual projects for follow-on vertical work will be implemented in accordance with function-specific criteria pertaining to civil, architectural, structural, mechanical, electrical and other engineered features of work.

2.2.3 Family Housing

The proposed family housing development area is located on developed land on AAFB, which is bounded to the north and east by the Pacific Ocean, to the south by privately-owned residential areas, and to the west by Route 9 and NWF (Figures 2-3 and 2-4). Family housing includes residences for accompanied permanent Marines (referred to as Permanent Change of Station or PCS) and their dependents and family-oriented support and recreational facilities. Unaccompanied Marines (usually "rotational" or part of the Unit Deployment Program or UDP) would stay at the main cantonment BEQs/BOQs during their shorter-term (approximately 6 months) assignment to Guam.

The family housing area would be located at the current AAFB family housing area. The proposed housing density at AAFB is 5.5 units per acre. The family housing area would be accessed by the existing family housing gate (the Santa Rosa Gate) at the northern end of Route 15, or from the AAFB Main Gate off Route 9. Existing family housing would be demolished and 912 family housing units would be constructed as replacements for existing AAFB housing in addition to the 535 family housing units required for USMC families. All of the 1,447 family housing units would be integrated into one large housing pool where all eligible personnel and families would live.

Expansion of existing community support facilities, such as the child development center, youth center, and temporary lodging facility may be required. Other potential new facility construction may include a new temporary lodging facility, a new community center, and a new Family Support Center.

The existing capacities of the utilities for the proposed AAFB family housing area are deemed adequate for the proposed redeveloped area. The proposed increase in the number of housing units and facilities is minimal compared to the current number of housing units and facilities. Additionally, the new facilities would implement energy and water efficient features meeting Leadership in Energy and Environmental Design silver or greater standards, which would reduce utility requirements. Revised distribution for potable water, and wastewater collection would be required.

Potable Water

Water for the family housing area would be provided by the current system, which would be modified to reroute the system along the new road alignments desired for the family housing layout. There will be a connection from the AAFB well field water storage tank to the AAFB water system to provide water to the proposed AAFB family housing area. The new potable water distribution pipes would be installed underground at least 3 ft deep. The width of the trench to install the pipes would be about 1.5 ft to 4 ft for 6-inch (in) to 24 in. pipes.

Wastewater Collection

The family housing wastewater collection system would include a network of gravity mains, manholes, two new wastewater pump stations; force mains and refurbishment of existing wastewater pump stations.

The family housing wastewater collection system would utilize the existing connection to the GWA wastewater collection system and would remain as is. Existing wastewater pump stations would be demolished as part of the Proposed Action. Wastewater would be conveyed to the NDWWTP for treatment and disposal.

Power

The existing AAFB main substation would have adequate capacity to serve the family housing, including the redeveloped housing units, new common facilities, and expanded common facilities. The distribution system would be rebuilt, enhanced, and reconfigured to accommodate the housing layout.

Solid Waste

Family housing areas would continue to have their solid waste handled as currently done for the existing AAFB housing area (Layon landfill).

2.2.4 Live-Fire Training Range Complex

The proposed LFTRC development area at AAFB NWF will require construction of the individual ranges, range support building, range towers, range access roads, and a perimeter fence (all within federally-controlled land at NWF), relocation of an ungulate exclosure fence, as well as the replacement of USFWS facilities within the Ritidian Unit of the Guam National Wildlife Refuge (GNWR) access to which would be restricted only while the Surface Danger Zone (SDZ) for the MPMG range is in use. The proposed area for the new GNWR administration buildings, visitor's center, and associated road and parking lot is approximately 12 acres (5 ha). The LFTRC would also require construction of new electrical, telecommunication, wastewater and water lines and/or facilities configured to operate with the existing utility infrastructure of AAFB NWF. The DON will coordinate with the GNWR to determine whether the current buildings will remain or be demolished.

The proposed LFTRC would include a known distance (KD) rifle range, KD pistol range, non-standard small arms (NSSA) range, modified record of fire (MRF) range, repairs to Route 3A, and a MPMG range. Grading requirements for construction of the ranges and associated infrastructure would include approximately 2,045,989 yd^3 (1,564,270 m^3) of cut and 1,921,210 yd^3 (1,468,870 m^3) of fill, resulting in a net requirement of 124,779 yd^3 (95,400 m^3) of cut. The limits of development for the LFTRC are depicted in Figures 2-5 and 2-6.

Development of the LFTRC is anticipated to occur in two phases that would construct the smaller ranges and repair/improve Route 3A under one phase and the MPMG range under the second phase.

The proposed LFTRC development would also include three range observation towers, target storage and maintenance shed, ready issue ammunition magazine, covered bleachers, portable toilets, perimeter fencing, safety signage, and parking. Range footprints would be entirely cleared of vegetation and the range would be designed with berms to contain expended rounds of ammunition within the range footprint. The LFTRC is an "open" range that does not include design elements such as overhead baffles to contain rounds beyond the traditional "backstop" berms. A more detailed description of the ranges, including the approximate footprint of each range, is fully described in the DSEIS Section 2.2.3.

Range utilization would depend on the number of personnel required to complete annual individual training events, the duration of each event, and the training capacity of each range. Proposed live-fire operations at the LFTRC are not continuous and would occur between 7:00 a.m. and 7:00 p.m. for up to 39 weeks per year, and night operations (estimated to occur 2 nights per week over 39 weeks per year) would occur between 7:00 p.m. and 10:00 p.m. or 6:00 a.m. and 7:00 a.m.

Figure 2-5. LFTRC – NW Field

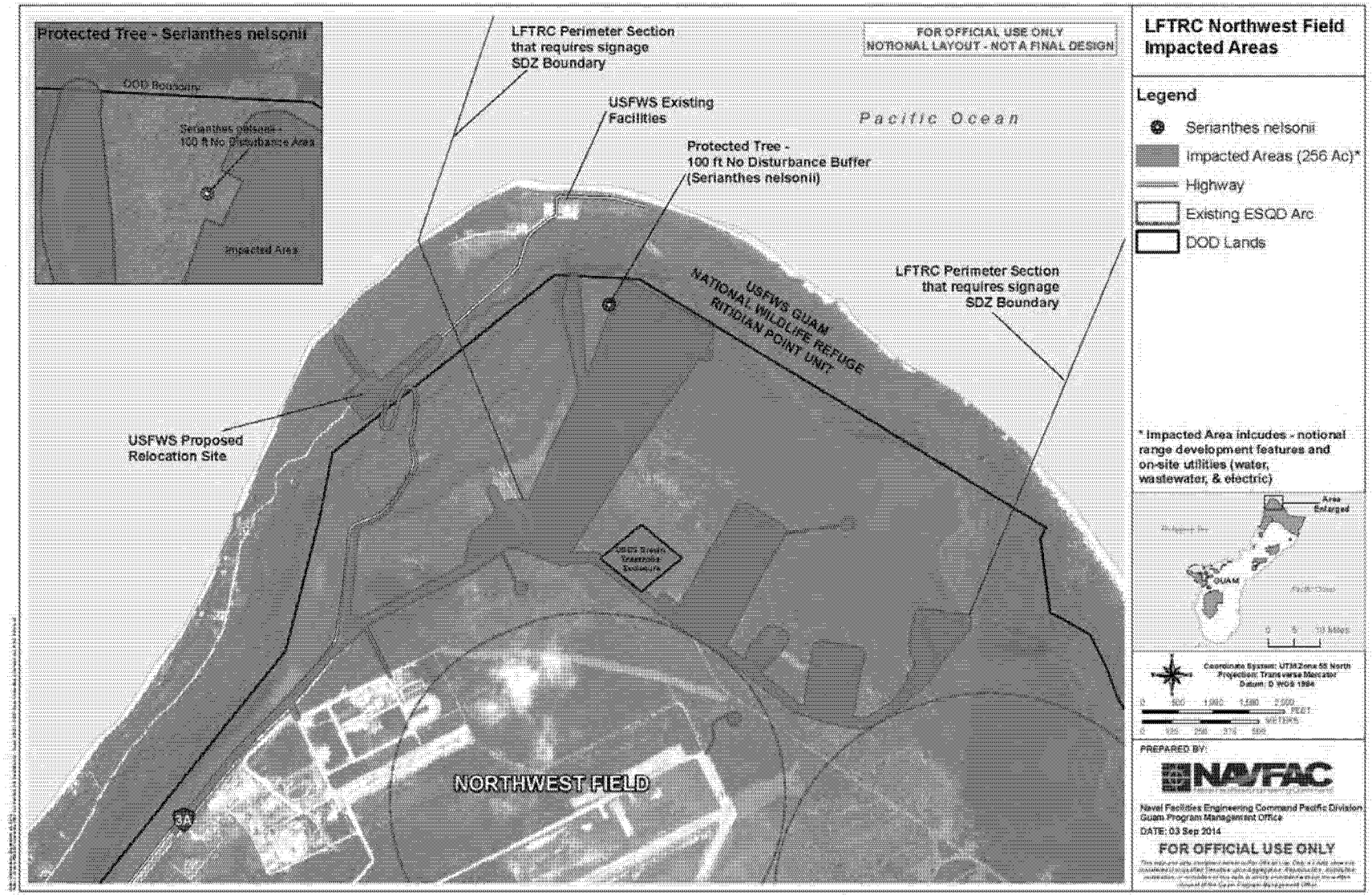
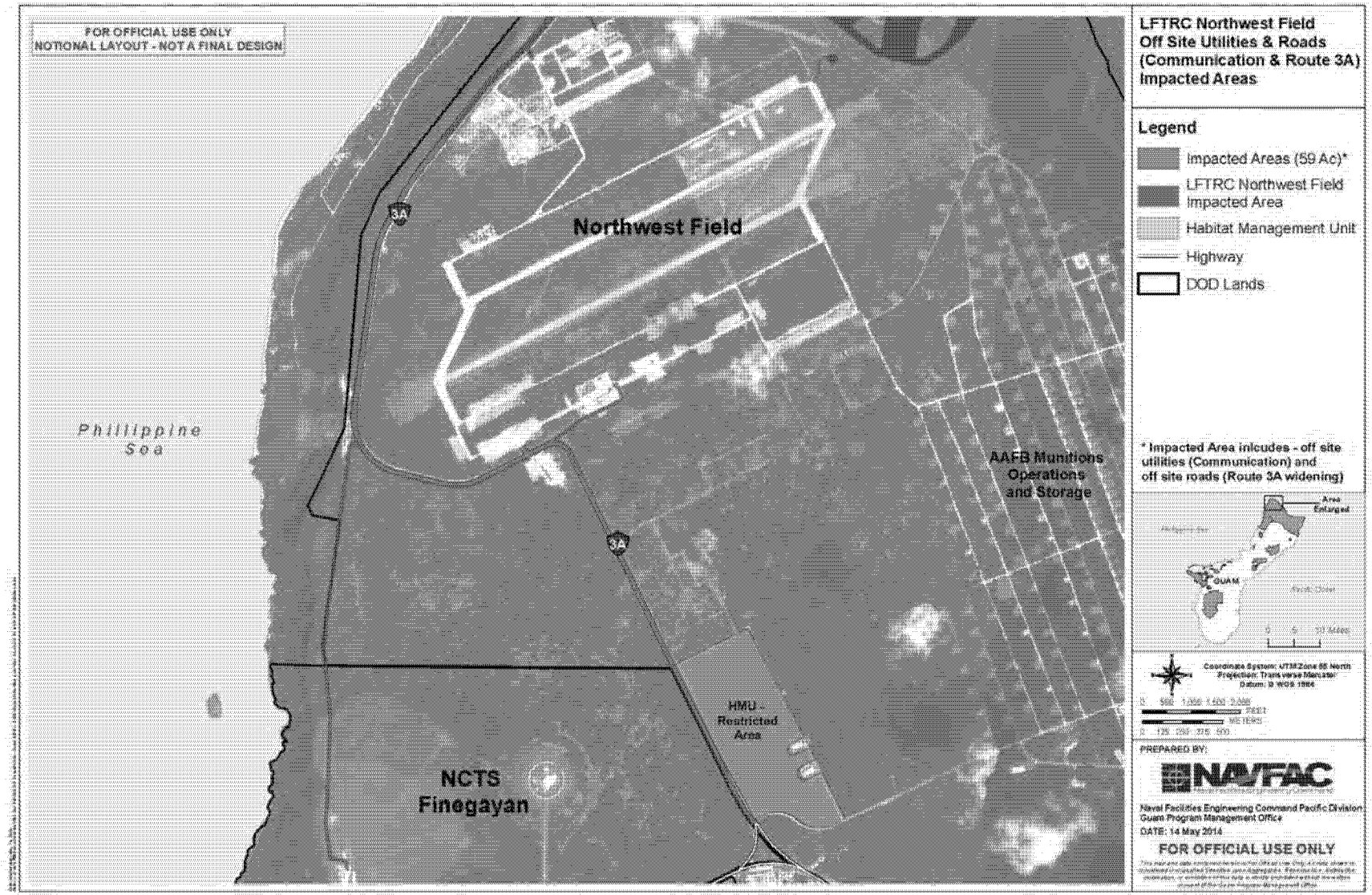


Figure 2-6. LFTRC – NW Field Utilities & Route 3A



Following construction, some non-native, non-invasive grassy vegetation may be utilized for erosion and storm water control in some areas of the range footprint in accordance with the DON's Guam Landscaping Guidelines.

In addition to the physical range footprint, an SDZ would delineate areas that fired ammunition fragments or ricochet may land, forming the outermost limit of the LFTRC. The DoD standard for risk acceptance on ranges is a 99.9999% level of containment, which means the probability of munitions (for inert ordnance) or a hazardous fragment (for live ordnance) escaping the SDZ is one in a million. The SDZ projects north and outward over lands under USFWS control and onto federal submerged lands. No construction or vegetation clearing will occur in the SDZ except for installation of signage. The DON would demarcate the SDZ beyond the shoreline through navigation map updates to alert maritime traffic of the potential hazard. For the land based perimeter of the SDZ, perimeter access roads (KD and MPMG), perimeter fencing and/or signage would indicate its boundaries for personnel and public safety. Approximately 3,701 acres (1,498 ha) acres of lands and submerged lands are required to support the SDZ. This includes approximately 142 acres (57 ha) of the Ritidian Point Unit of the GNWR and 3,059 acres (1,238 ha) of the submerged lands of the Philippine Sea.

The LFTRC (as well as the Hand Grenade (HG) Range in the next subsection) would be managed in accordance with Marine Corps Order (MCO) 3550.10, Policies and Procedures for Range Training Area Management, which addresses safe, efficient, effective, and environmentally sustainable use of the range area. Examples of measures include a Range Safety Program, range maintenance, event scheduling, access control, fire management, and environmental protection and monitoring activities. A thorough explanation of range management measures that remain inherent to the Proposed Action can be found in the 2010 FEIS (Volume 2, Chapter 2, Section 2.3.1.4).

Fire management is a key component of range management. The DON goal is to reduce the impact of fires by limiting their frequency, size, and severity while still allowing the USMC to maintain a high level of combat readiness. The range management plan will include the following elements of fire management:

1. A Fire Danger Rating System tailored to the specific military uses at the LFTRC and the local weather and fuel conditions will be established. Weather readings will be taken every hour by remote automated weather stations (RAWS) placed at the installation. This information is immediately available to Range Control, who use the output from the remote automated weather stations to determine the level of fire danger. This, in turn, determines any restrictions placed on military training for that hour. Restrictions are relayed to troops in the field via radio transmission. By restricting highly fire prone activities during periods of high fire danger, the likelihood of a fire start is reduced. Additionally, fires that are ignited are more likely to occur during periods of low or moderate fire danger, making them easier to control and extinguish.

2. Locations and standards of fire breaks and fuel breaks. Fire breaks are similar to four-wheel-drive roads and are cleared of all vegetation to mineral soil. Fuel breaks are swaths of cut, burned, grazed or otherwise modified vegetation so that a fire's behavior is reduced. The fuel break widths are determined by fuels, topography, and prevailing winds. The frequency of a fuel break's upkeep is dependent on the speed of regrowth and/or colonization. Generally speaking, fuel and fire breaks in wetter locations require more frequent upkeep because vegetation will grow more rapidly than in dry locations.

3. Fuels management. All available fuel management techniques will be considered for fire break, fuel break, or fuel management area. Standard on-the-ground application is limited to mechanical cutting, herbicide application, and prescribed fire.

4. Fuel management corridors will be established and maintained providing areas through which fire will not carry. These corridors will provide several distinct areas where fire may be contained in order to prevent a catastrophic fire event. Each corridor will be approximately 100 to 300 m wide, although terrain, safety concerns, or protected resources may constrain the width in some areas. Fuel specifications within the corridor require that canopy cover not exceed 20 percent.

5. Standard Operating Procedures (SOP). SOPs outline responsibilities for fire prevention, Fire Danger Rating System usage, staffing levels, equipment caches, fuel modifications, proper fire suppression actions, and post-fire reports. The SOPs also include fire prevention briefings to be given to range users prior to commencement of training, notification lists in case of fire, operational decision charts for fires, and maps of resources, fuels, fire breaks, and Fuel Management Areas.

6. Range Control approval and guidance. Prior to firing all pyrotechnics (including tracers), Range Control approval and guidance must be obtained. Fire Department and Range Control personnel will have the authority to stop live-fire training for non-compliance with any training regulation and/or Standard Operating Procedures.

7. Fire Suppression. Water trucks (pickup truck with a tank in the back) will be on-site as a first responder vehicle. Water trucks may be supported by a fire truck or helicopter, as warranted.

The proposed LFTRC development area at AAFB NWF will require re-location of an ungulate exclosure fence at NWF that was a conservation measure to offset habitat loss from vegetation clearing and aircraft operations associated with the Intelligence, Surveillance, Reconnaissance (ISR) Strike BO (2006-F-0266) and NWF Beddown project (2006-1-0281). The NWF Beddown project proposed to construct a 133 ac (54 ha) ungulate exclosure while the ISR Strike project consists of an approximately 494 ac (200 ha) fenced area to prevent incursion of deer and pigs. To date, a 312 ac (126 ha) ungulate fence at NWF has been constructed. The fence compensates for 113 ac of NWF Beddown and 199 ac for the ISR Strike project.

In order to compensate for the loss of the 312 ac ungulate fence, the Marine Corps relocation program will install approximately 17,559 ft of ungulate exclusion fencing in the area referred to as North Finegayan, right (Figure 2-14). The ungulate exclusion fencing will encompass approximately 312 ac of forested vegetation.

Consideration and fulfillment of all other components of the ISR Strike conservation measures will be subject to future consultation between the Air Force and USFWS.

2.2.5 Hand Grenade Range

In addition to the small arms training ranges collocated within the proposed LFTRC, the Proposed Action also includes a development area for a separate HG Range at Andersen South, depicted in Figure 2-7. The proposed HG Range would include an approximately 0.9 acre area developed as a hand grenade training complex for the M67 fragmentation grenade and will be connected to existing utility infrastructure where available.

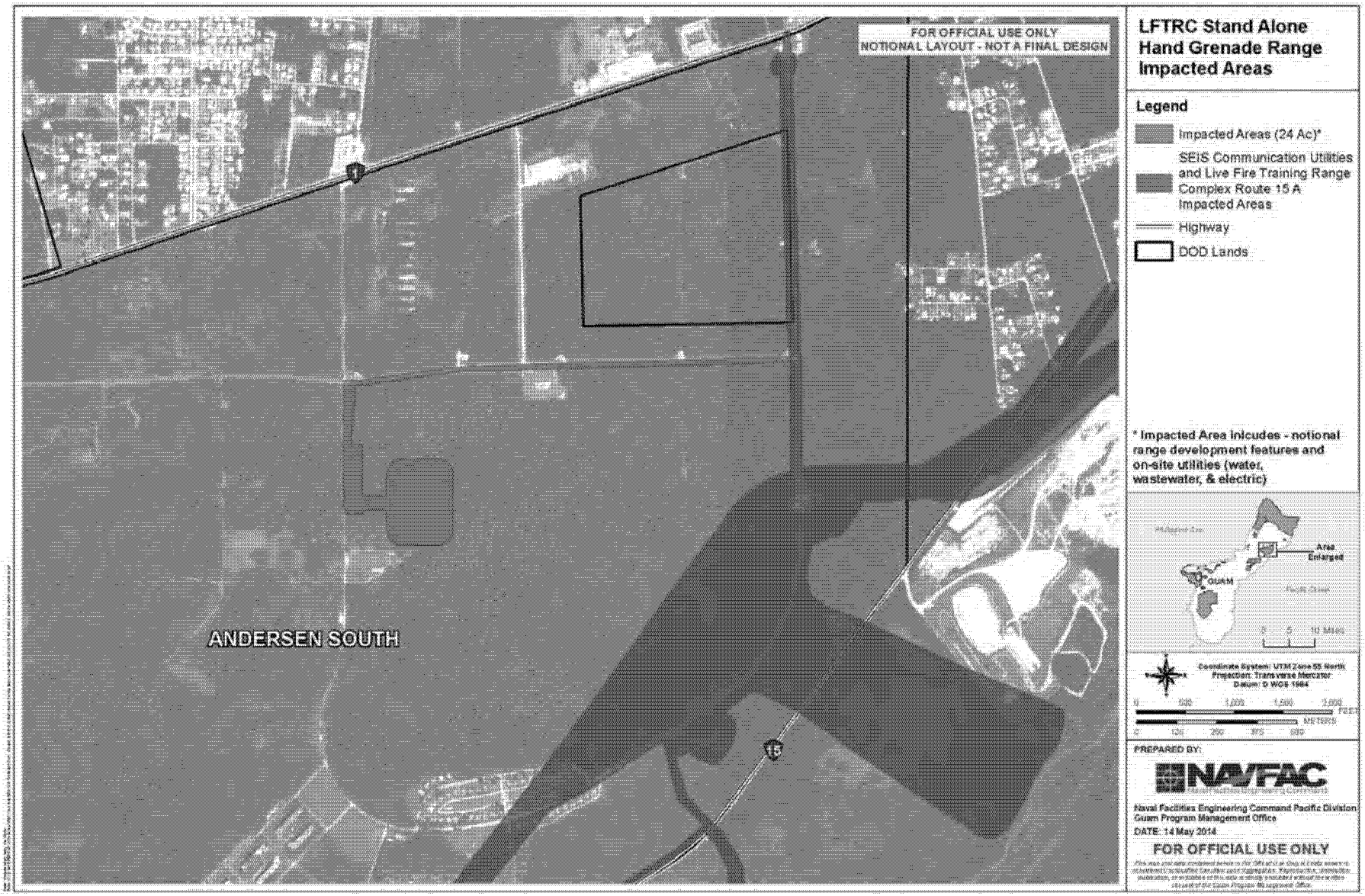
The following features would be developed within the hazard zone: a holding shelter for four persons, four throwing positions with grenade sumps, a range observation tower with ballistic glass, and a grenade

"dudded" impact area. A grenade house would be collocated with the grenade throwing pits. There will also be a concrete munitions storage (i.e., magazine) surrounded on three sides by earthen berms for the temporary storage of hand grenades during training events. In addition to the live-fire area, there would be a 1.0 acre non-live-fire training area developed adjacent to the range and outside of the SDZ. The training area would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions, portable toilets, and a parking area. Inert practice grenades would be used at this training area to provide familiarization training prior to proceeding onto the live-fire area of the range.

2.2.6 Information Technology/Communications

The proposed Information Technology/Communications (IT/Comm) development area would require inter-base connections between the proposed USMC main cantonment area, and other existing bases, the proposed LFTRC, and 2010 ROD-covered training facilities at Andersen South. These hardwired connections would consist of up to eight 6 inch conduits buried approximately 3 ft deep. Off-site conduits would be encased in concrete and would have lockable manholes for security. Because redundant off-island communication paths are needed, an additional connection to the Tata Communications cable termination facility (in Piti) from AAFB may be required. Off-site conduits would follow existing roads and rights-of-way between the facilities, as shown in Figure 2-8. The completed utilities would not normally be visible after restoration of the disturbed ground to original or better condition (following the Guam Landscaping Guidelines) as these would be primarily underground.

Figure 2-7. Stand Alone Hand Grenade Range



2.2.7 AAFB Well Field and Associated Water System

Increased water supply for the main cantonment area would come from the proposed AAFB well field, refurbished wells, and Navy's existing water system. Based on conservative estimates, it is anticipated that to locate one well of sufficient yield to support production approximately three test wells would be required. During testing, only those wells with good water quality and capacity will be identified as production well sites. Test wells deemed unsuitable will be filled and capped and left in place, restored or converted to monitoring wells for management of the National Groundwater Level Archive.

The development area would accommodate the construction of the approximately 22 test wells, 11 production wells, and associated equipment as depicted in Figure 2-9. Note that the actual footprint of the final production wells and the access roads to each is not known at this time, but it would occur within the well field limits as shown.

During the design phase, the design contractor will conduct site investigations and drill test wells, determine locations of the wells, and design the entire water production system (wells, feeders, & storage tank). During the construction phase, the construction contractor will convert the test wells into production wells based on the locations identified in the design document and construct the water production system per the design specifications.

- Prior to start of work, efforts will be made by the design contractor to minimize disturbance to the limestone forest by inspecting the area with a DON biologist and identifying "already disturbed areas."
    - Where disturbed areas cannot be identified, for each well location, a 14 ft path will be created for the drill rig, trucks/vehicles and other equipment to get to the test well locations.
    - An approximately a 100 ft x 100 ft (.23 ac) work area will be required to set up the equipment at each test well location.
    - For each test well, an 8 in. to 12 in. borehole will be drilled to a depth of approximately 500 ft to 600 ft below ground surface. A submersible pump will be placed at the bottom of the well, and a pump test and water sampling conducted. Based on the results of the pump test and water sampling, the well will either be abandoned or identified as a potential production well. For test wells identified as a potential production well, global positioning system survey coordinates will be taken and a stake placed at the test well site.
    - A production well consists of well casing (approx. 10 to 12 in. diameter), screen, gravel pack, submersible well pump, pump motor housing, and surface/borehole seal. At each well station the following will be provided: well housing, discharge piping, and flow meter. Each well head will have electrical lines, water transmission pipes, and feeders to each well. The estimated disturbance area during construction is 100 ft x 100 ft (.23 acres).
    - Locations of the water transmission and feeder lines will normally follow already disturbed areas made during test well drilling (path made by the drill rig/vehicles/equipment). A 20 ft to 30 ft wide strip will be required for construction of the pipelines, and manholes, valves, bends, anchor blocks, etc. as well as backfill material. The main transmission lines ranging from 8 in. to 16 in. will connect the well field storage tank facility to feeder lines. The individual well feeder lines, approximately 6 in. will connect the wells to the main transmission lines.
    - In the well field storage tank facility area, there will be a booster pump, water treatment, storage tank, electrical room and central emergency backup

generator and fuel storage tank. In addition to the 14 ft path for cranes/vehicles/equipment, an approximately 550 ft x 650 ft area (8.2 acres) will be disturbed during construction of the water storage tank and associated facilities.

- Unless cuttings or excavation materials are deemed contaminated or unacceptable as fill material, cuttings will be placed back into a borehole or trench. Unacceptable fill material or excess cuttings/excavation material will be removed from the site.

- When 68 acres (75% of the disturbance area) is reached, the construction contractor will stop work and re-evaluate to determine if 90 acres will be exceeded.

The new potable water production wells would feed a new well field collection tank, pump and water treatment facility (chlorination and fluoridation), all proposed within AAFB. The main cantonment area would be provided with a new ground level water storage tank supplied by the new well field storage tank. A water pump station with an emergency generator would be utilized. The new potable water distribution pipes would be installed underground with a minimum depth of 5 ft. The width of the trench to install the pipes would be about 1 ft to 3 ft.

2.2.8 Off-Site Utilities (Water, Sewer and Electrical)

The Proposed Action will require a development area for off-base water and electrical utilities to support the main cantonment, family housing and LFTRC activities. Although the linear construction occurring alongside roadways would be limited to narrow areas of trenching and excavation for installation of utilities along the affected alignment, a 50-foot corridor was included to conservatively capture potential disturbance. The extent of the proposed area of development is depicted inn Figure 2-10 and is inclusive of the disturbance buffers. The Off-Base Utilities development area would upgrade existing 34.5 kV electrical lines, by installing a new underground 34.5 kV line from Harmon Substation to AAFB Main Substation.

The off-base water distribution system will convey water produced at the new AAFB well field to the main cantonment area through Routes 9 and 3A.

2.2.9 Guam High School Expansion

The proposed Guam High School development area located at the Naval Hospital site in central Guam would expand the existing facility to accommodate additional students associated with the USMC relocation. The existing school is a two-story, 116,174 ft^2 facility designed to accommodate approximately 500 students. The limit of disturbance within the existing open space is depicted in Figure 2-11.

The additions to the existing building will increase available space by approximately 25,500 ft^2 (2370 m^2) and would typically include construction activities such as geotechnical studies for design, site grading, utility excavation, drainage and footing preparation, and construction of building-associated structures (e.g. foundations, walls, columns, roof systems, etc.). The completed work will also include indoor/outdoor lighting, air conditioning, fire protection, telecommunication, space furnishings, final landscaping, and other appurtenances and features to ensure a fully-functional and usable educational facility.

Figure 2-8. Communication Utilities – MC/FH FIN/AAFB & LFTRC Northwest Field

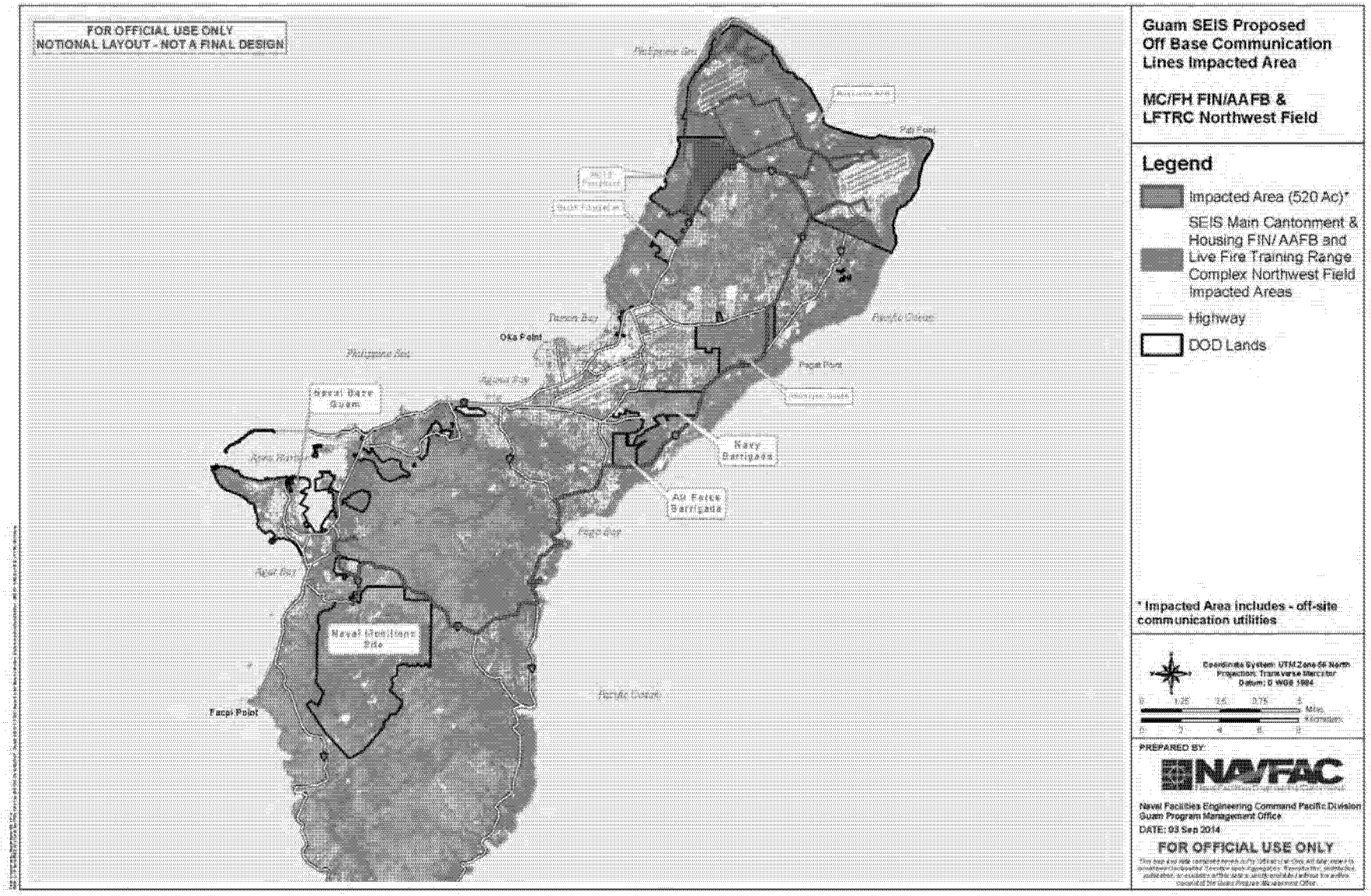


Figure 2-9. Water Well Development Area

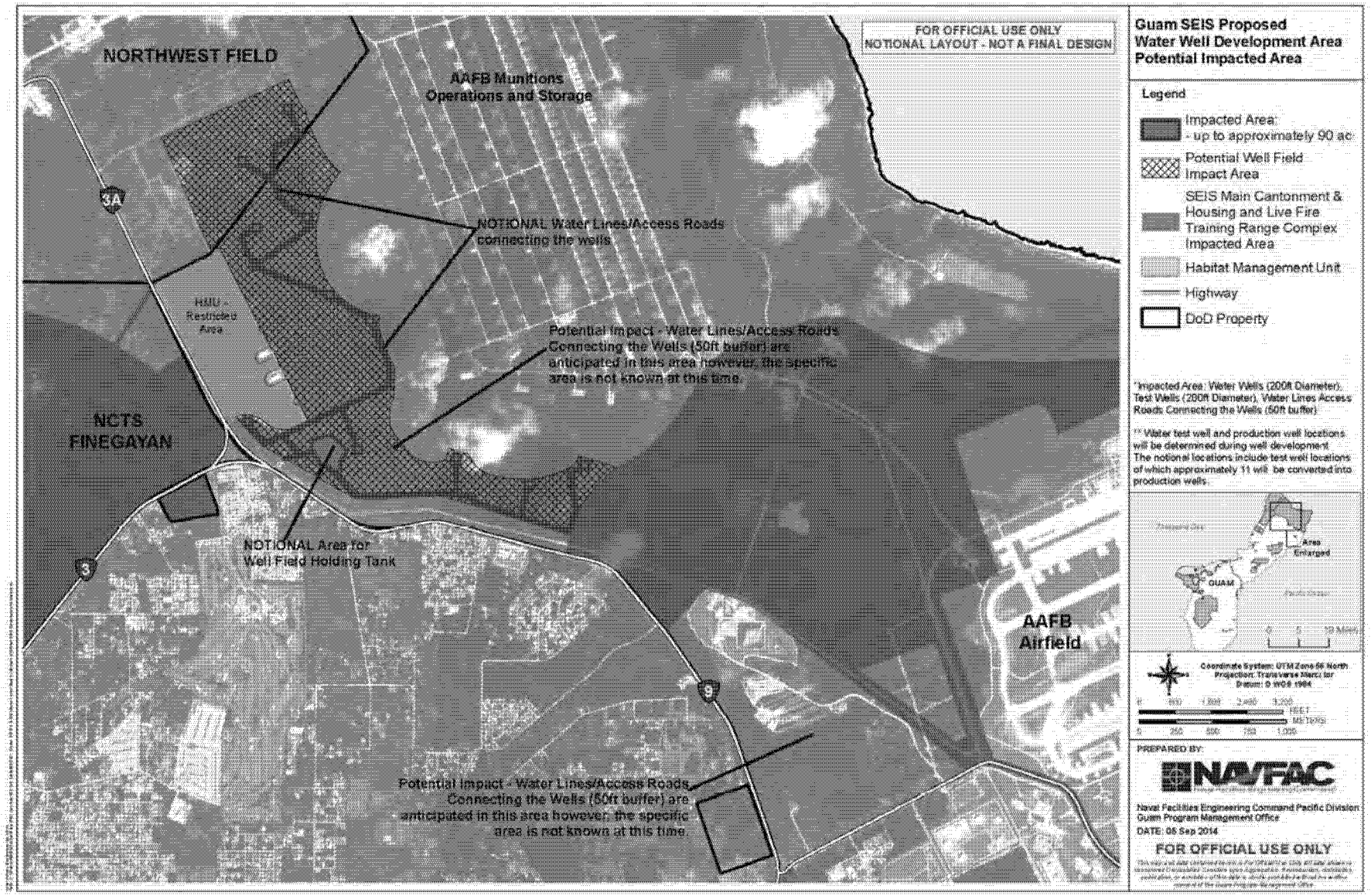


Figure 2-10. Electrical and Water Off-Base Utilities

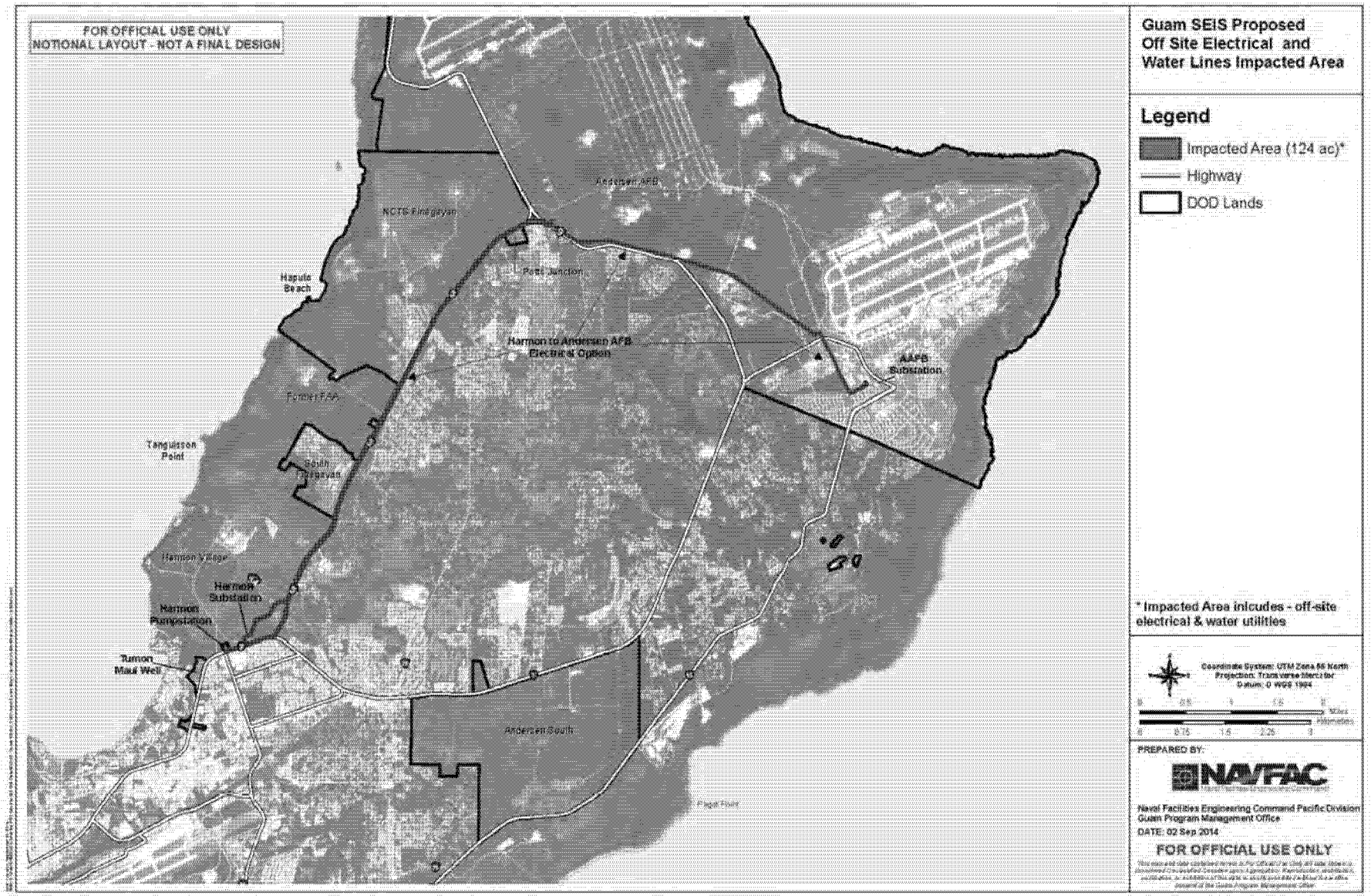
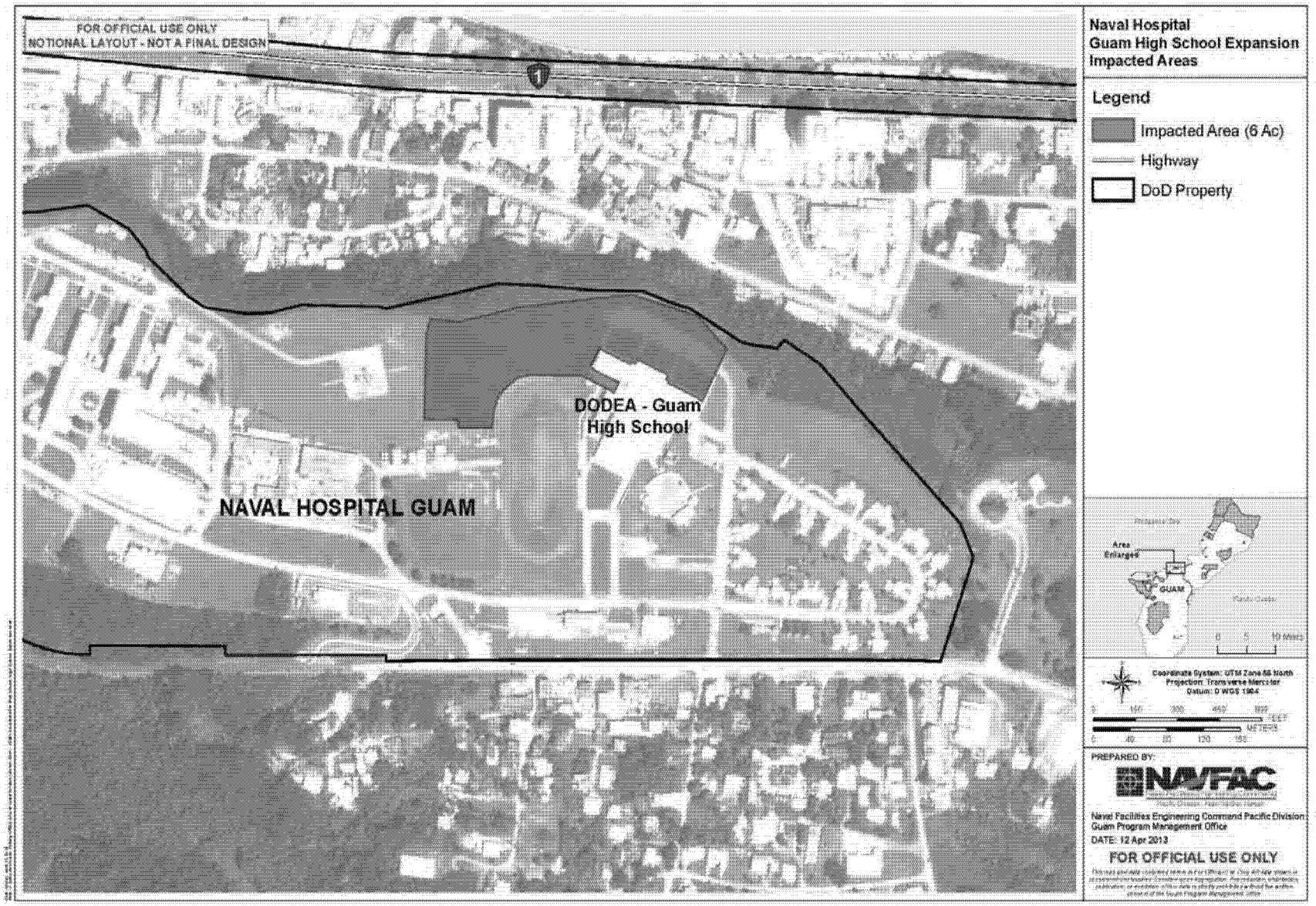


Figure 2-11. Guam High School Expansion

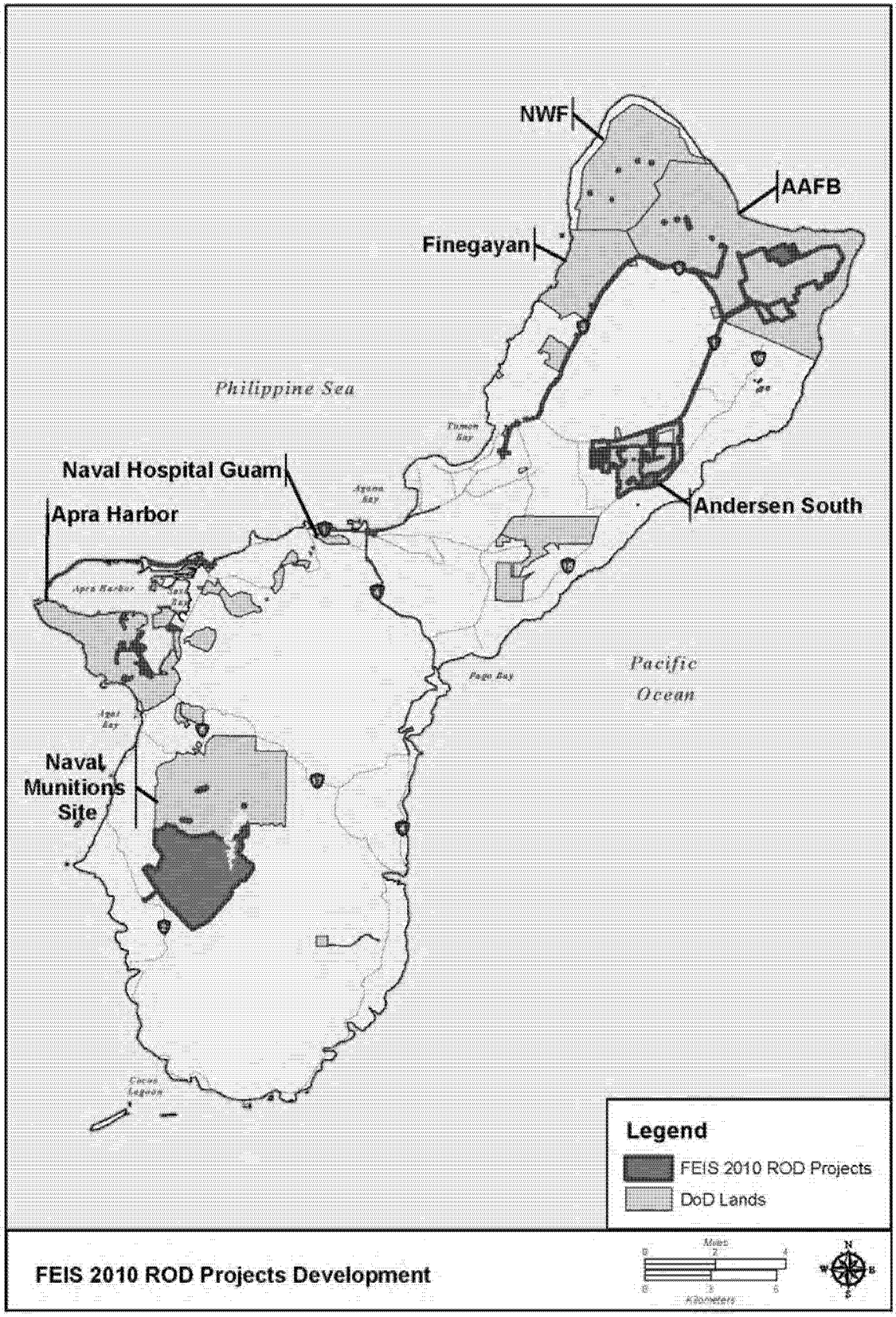


2.2.10 2010 ROD Projects Development Areas

The 2010 ROD related actions that were not affected or remain unchanged by the 2012 Roadmap Adjustments SEIS are discussed in detail in the 2010 FEIS (Volume 1, Chapter 2: Overview of Proposed Actions and Alternatives, Section 2.2: Marine Corps Relocation – Guam, pages 2-7 through 2-17), and are summarized in Table 2-2 (adapted from DSEIS Table 6.2.1-1), summarized in the 2010 BO, and depicted in Figure 2-12.

The proposed carrier berthing, four ranges and associated infrastructure on Tinian, and the Army Missile Defense Task Force assignment to Guam are not included as part of the Proposed Action and have an independent disposition from the USMC relocation.

Figure 2-12. 2010 ROD Projects Development Area



2.3 BEST MANAGEMENT PRACTICES

The SEIS identifies Best Management Practices (BMPs) that are incorporated into the Project Description. For the purposes of the SEIS, BMPs are existing policies, practices, and measures that the DON would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing, reducing, or eliminating impacts, BMPs are distinguished from potential mitigation measures proposed in the SEIS because BMPs are:

(1) Existing requirements for the Proposed Action,

(2) Ongoing, regularly occurring practices, and

(3) Not unique to the Proposed Action.

The BMP's from the SEIS applicable to the BA are listed in Table 2-2.

Table 2-2. Best Management Practices Applicable to this BA

BMP	Description	Impacts Reduced/Avoided	Timing
Contractor Education Program	The DON contractor education program is to ensure construction contractor personnel are informed of the biological resources in the project area, including invasive species, special-status species, avoidance measures, and reporting requirements.	Inadvertent impacts to terrestrial biological resources due to lack of awareness of resource presence, sensitivities, and protective measures	Pre-C and C
Contractor Plans and Specifications	All construction will occur within the limits of construction shown in the plans and specifications.	Habitat loss	Pre-C and C
Pre-Construction Surveys for the Mariana Fruit Bat	For projects within or in the vicinity of suitable fruit bat habitat, surveys following the USFWS-approved Joint Region Marianas (JRM) protocol will be conducted 1 week prior to the onset of work. If a fruit bat is present within 492 ft (150 m) of the project site, the work must be postponed until the bat has left the area.	Avoid and minimize impacts to fruit bats	Pre-C and C
Biosecurity Measures	Incorporate biosecurity measures (e.g., brown treesnake (BTS) interdiction measures, onsite vegetation waste management procedures, outreach/education, rapid response, and monitoring the effectiveness of HACCP) into construction, operations or training events.	Inadvertent spread of non-native species on Guam or to other locations off of Guam. The implementation of biosecurity measures decreases the likelihood of introducing pests harmful (either predation or outcompeting native species) to native vegetation, invertebrates, vertebrates, as well as human health	Pre-C, C and Ops
Hazard Analysis and Critical Control Point (HACCP) Plan	Construction contracts contain a requirement to develop a HACCP Plan which will identify risks and potential pathways for non-native species and will outline procedures for controlling and removing risks identified. Construction contracts also contain a requirement for inspections and proper re-use or disposal of vegetation to avoid contributing to the further spread of the coconut rhinoceros beetle. HACCP plans will be approved and inspected by the biological monitor.	Inadvertent spread of non-native species on Guam or to other locations off of Guam.	Pre-C and C
Guam Landscaping Guidelines	Appropriate or non-invasive species will be planted in all new landscapes.	Reduce potential impacts associated with non-native vegetation, promotes habitat for native species, reduces water consumption, and reduces the need for fertilizers.	C

LFTRC Range Berm Controls	LFTRC range berms will contain native or non-invasive herbaceous vegetation, and other engineering controls.	Helps to manage stormwater runoff and control erosion. The berm will minimize the number of bullets that may fall outside the range footprint.	C
Brown Treesnake Interdiction (36 Wing Instruction 32-7004, Brown Tree Snake Control Plan and COMNAVMAR Instruction 5090.10A, Brown Tree Snake Control and Interdiction Plan).	Joint Region Marianas (JRM) has established a comprehensive BTS interdiction program to ensure that military activities, including the transport of civilian and military personnel and equipment to and from Guam, do not contribute to the spread of BTS. Interdiction requirements (e.g., trapping and inspections at ports and cargo facilities, aircraft, inspections of household good movements, and biosecurity plans for training events) are specified in instructions (Appendices B and C) as well as the annual Work Financial Plan that is developed in cooperation with USDA Wildlife Services.	Inadvertent spread of BTS to other locations off of Guam	Pre-C, C and Ops
Lighting Installation	Lighting will be designed to meet minimum safety, sustainability, antiterrorism, and force protection requirements. Hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle land habitat and fruit bat roost areas. "Night-adapted" lights will be installed in the briefing and bleacher areas at NWF and Andy South. Illumination of forest, coastline or beach will be kept to an absolute minimum.	Avoid and minimize impacts to sea turtles and fruit bat roosts.	Pre-C, C and Ops
Aviation training in NMS	All aviation training will be conducted so that flights will approach the southern portion of the NMS over the Talafofo River watershed and Fena Reservoir at heights of 1,000 ft (305 m) or greater above ground level. Flights may go up the Ugum River at altitudes of 1,000 ft (305 m) or greater above ground level until they reach 9,843 ft (3,000 m) from the mouth of the river at Highway 4 and then flights may conduct low level terrain flights. Low-level training flights will be restricted to the southernmost portion of the NMS where swiftlets are not commonly present.	Avoid and minimize impacts to Mariana gray swiftlets	Ops
Ground training in NMS	Consistent with the MIRC BO, the DoD will maintain 328-ft (100-m) no training buffers around the known Mariana swiftlet nesting caves (e.g., Mahlac Cave, Fachi Cave, Maemong Cave) in NMS.	Avoid and minimize impacts to Mariana gray swiftlets	Ops

Legend: C = construction; Ops = operations; Pre-C = preconstruction;

2.4 CONSERVATION MEASURES TO MINIMIZE POTENTIAL EFFECTS TO THREATENED AND ENDANGERED SPECIES

This section describes the conservation measures the DON has or will implement to minimize or compensate the effects on listed species due to construction and operations. Conservation measures are actions intended to benefit or promote the recovery of listed species. Some conservation measures were initiated in accordance with the 2010 BO and some are new conservation measures designed to specifically address the direct and indirect impacts to threatened or endangered species as a result of the revised Proposed Action (Table 2-3).

As part of the proposed action, DON is committed to implementing the conservation measures listed below. After completing the conservation measures, the long-term management of the natural resources will be incorporated into the Integrated Natural Resources Management Plan for the installation."

Table 2-3. Conservation Measures Applicable to this BA

Conservation Measure	Status
Regional Biosecurity Plan	In progress – initiated as part of 2010 BO
Biosecurity Outreach and Education	In progress – initiated as part of 2010 BO
Brown Treesnake Interdiction at the Commercial Ports	In progress – initiated as part of 2010 BO
Brown Treesnake Research and Suppression	
BTS Fence (160 ac unit)	Future proposed
BTS Fence (300 ac unit)	Future proposed
BTS suppression (160 ac unit)	Future proposed
BTS suppression (300 ac unit)	Future proposed
Feral Cat Control (160 ac unit)	Future proposed
Feral Cat Control (300 ac unit)	Future proposed
Rodent Control (160 ac unit)	Future proposed
Rodent Control (300 ac unit)	Future proposed
Install ungulate fence (NBG) and initiate ungulate eradication (3,114 acres)	Completed
Forest enhancement (approximately 1,072 acres)	
Install ungulate fence (Fin, N. Fin)	Future proposed
Ungulate eradication/control (Fin, N. Fin)	Future proposed
Invasive plant removal (Fin, N. Fin)	Future proposed
Native plant outplanting (Fin, N. Fin)	Future proposed
Native plant establishment (Fin, N. Fin)	Future proposed
Serianthes Bracing	Future proposed
Sea Turtle Public Outreach	In progress – initiated as part of 2010 BO
Mariana Fruit Bat Recovery Actions on Rota	Completed

2.4.1 Regional Biosecurity Plan

To address pathways and encourage a more holistic approach to managing invasive species, the DON has funded the development of a Regional Biosecurity Plan (RBP) for Micronesia and Hawaii (formerly referred to as the Micronesia Biosecurity Plan). Individual activities for various species will continue, but the DON and others agree it is more efficient to manage pathways and prescribe corrective measures for a suite of species which will be monitored at discrete control points over time. The RBP will provide stakeholders in Micronesia and Hawaii with a platform for coordination and integration of inter-agency invasive species management efforts such as control, interdiction, eradication, and research.

1. Phase I Risk Assessments: The DON contracted with the United States Department of Agriculture (USDA) Wildlife Services, USDA Animal and Plant Health Inspection Service (APHIS), Plant and Protection and Quarantine, USDA APHIS Veterinary Services (terrestrial), U.S. Geological Survey Biological Resources Discipline (freshwater), and Smithsonian Environmental Research Center

(marine) for the development of the risk assessments for the RBP. In addition, the National Invasive Species Council was contracted to coordinate the preparation of the risk assessments for the RBP and prepare an executive summary. Phase I was completed in July of 2013.

2. Phase II Peer Review and Strategic Implementation Plan: In September of 2011, the DON entered into a cooperative agreement with the University of Guam (UoG) to develop Phase II of the RBP. The UoG was tasked with reviewing all three risk assessments and providing an assessment as to whether the three risk assessments were comprehensive within their respective environment and sufficiently addressed risks posed to Micronesia and Hawaii. The UoG and its resource expert collaborators evaluated each risk assessment to ensure they sufficiently:

a) evaluated the biosecurity risks particular to each environment;
b) addressed organisms to be of greatest risk to Micronesia and Hawaii (as it relates to Micronesia);
c) identified the necessary elements of an effective biosecurity program;
d) identified management responses that are the most appropriate and have been described and prioritized in sufficient detail to allow for ease of implementation; and
e) incorporated the input of the relevant regional entities with responsibilities for biosecurity.

The review of the risk assessments was completed in January of 2013.

The UoG was also tasked with developing a strategic implementation plan. The strategic implementation plan component is to:

a) identify and analyze challenges to regional implementation of the RBP and provide multiple implementation alternatives, where appropriate;
b) identify infrastructure, funding, process, political, legislative, policy and capacity gaps within the various region's agencies and jurisdictions relevant to potential invasive species pathways;
c) identify policy and regulatory changes needed to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and species for the region;
d) evaluate the technical and institutional capacity (staff, training, etc.);
e) assess infrastructure needs;
f) coordinate with related initiatives; seek out successful models, assistance and collaboration from organizations involved in invasive species management; analyze biosecurity program implementation elsewhere and assess applicability to Micronesian region;
g) target outreach and awareness;
h) identify potential long-term funding mechanisms;
i) identify methods for measuring success/effectiveness, as well as the labor/equipment costs, in U.S. dollars, required to maintain those methodologies;
j) address improvement of biosecurity protection actions;
k) address biological threats associated with enhanced military activities, tourism, trade, business and economic growth;
l) recommend solutions to challenges;
m) recommend strategies (and associated budgetary needs to implement each strategy) to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and invasive species for the region;
n) provide a template to realistically implement the biosecurity strategies identified in the RBP in the United States and within international frameworks.

In May of 2014, the UoG hosted a regional workshop in order for the jurisdictions and development partners to have a final joint working session in which to review and conclude the updating of the implementation component before finalizing the RBP. The final RBP will be completed in 2014.

Although the RBP is not finalized, several of the recommendations are incorporated into the Project Description as BMP's:

a. Onsite vegetation waste management procedures - Green waste will be handled by the contractors at designated laydown areas within the limits of construction. Contractors will be required to divert all the green waste. The larger-sized green waste consisting of trees and stumps will be processed into mulch and the smaller sized green waste will be processed into compost.

A proposed green waste processing facility at NBG Landfill may also be used to process green waste generated during construction. The DoD will seek permit authorization from the Guam Environmental Protection Agency for the proposed green waste processing facility.

b. DON's *Final Guam Landscaping Guidelines* - The DON has developed a manual providing landscaping design guidelines specific to appropriate plant selection and establishment for all the DON construction activities on Guam (NAVFAC Pacific 2011). This manual implements required DON policies including, but not limited to:

- use of native regional plants for landscaping;
- design, use, and promoting construction practices that minimize adverse effects on natural habitat;
- pollution prevention by reducing fertilizer and pesticide use, integrated pest management practices, recycling green waste (composting), and minimizing runoff;
- implementing efficient water practices; and
- preventing the introduction of invasive species.

c. Biosecurity outreach and education - The DON has initiated and will continue implement a targeted, comprehensive outreach and education program for DoD and civilian populations for biosecurity focused on prevention. As a starting point, the DON contracted for the development of biosecurity outreach and education materials. The contractor has designed and produced an activity booklet, a two-sided, tri-fold, educational brochure with an associated poster that differentiates native from introduced species, defines invasive species, describes the known impacts of invasive species on native species and ecosystems, and what can be done to prevent and control invasive species. This effort also included the development of radio public service announcements (PSA) in three languages, and a television PSAs both of which aired for one month in September of 2013 during peak broadcasting times.

Going forward the program may include the development of additional informational videos, expansion of the radio PSAs broadcasts, and other print media as well as active public outreach.

The DON's biosecurity outreach and education program has already begun concurrent with the actions that were initiated under the 2010 ROD and will continue until 5 years after the 2015 ROD.

d. HACCP planning - HACCP planning is a pathway management tool that provides a comprehensive method to identify risks and focus procedures to prevent spread of species through pathways. Construction work could unintentionally spread non-target (potentially invasive) species. These non-targets could hitchhike on construction equipment or be included in shipments of materials and supplies from locations outside of Guam. The pathways used by invasive species to move into new locations are not always obvious. Many problematic species, diseases, and parasites have been transferred to new locations as undetected (and unplanned) hitchhikers. HACCP planning is a management tool that provides a structured method to identify risks and focus procedures. Understanding pathways and developing plans to reduce non-target species and prevent biological contamination is necessary to avoid unintended spread of species.

In August of 2011, the DON sponsored several HACCP training courses for DON employees and construction contractors. A HACCP Planning Overview for Managers was held on Monday, August 8, 2011 and 2 two-day HACCP Planning courses were held August 9 & 10 and August 11 & 12, 2011. Over 60 people attended the three courses. Additional trainings are held at the various project sites when there is worker turnover.

For the 2010 ROD projects, the DON has required all construction contractors to develop and implement HACCP plans for their construction activities. The construction contractors are to identify and implement control measures to prevent the inadvertent movement of non-native, invasive species to Guam and to and from the project site to other locations. The contractor is required to establish appropriate facilities that comply with all environmental laws and regulations, provide training for proper vehicle hygiene, and promptly take corrective and preventative actions for noncompliance. This includes vehicle washdown and inspection for soil and other materials and appropriate control measures are implemented to prevent the inadvertent movement of non-native invasive species from the project site to other locations.

Construction contractors are required to provide documentation that supports prevention, worker awareness training, and control of non-native invasive and pest species in the project area and efforts to prevent the movement of non-native invasive species to areas outside the project area, whether in a purposeful or inadvertent manner. The contractor is responsible for ensuring that their employees receive applicable environmental and occupational health and safety training, and keep up to date on regulatory required specific training for the type of work to be conducted onsite. This may include, but is not limited to HACCP planning, species specific information (e.g., brown treesnake and coconut rhinoceros beetle), regulated pest list, threatened and endangered species information, and proper washdown and inspection techniques for equipment.

e. Monitoring to evaluate effectiveness of HACCP - To document the effectiveness of the HACCP implementation at construction sites, the DON has developed and implemented a long term monitoring program for terrestrial vegetation. For any clearing of vegetation that is adjacent to or contiguous with recovery habitat, the perimeter and 98.4 ft (30 m) into the habitat will be surveyed to identify vegetation community species composition.

The DON contracted a baseline ecosystem monitoring study for projects on AAFB in 2011. Transects were focused on areas where newly introduced species were most likely to occur. The intent of the project was to establish a baseline of both native and non-native plants present prior to the beginning of planned construction activities. This baseline will serve as a reference for subsequent monitoring efforts conducted concurrently with construction in order to aid in evaluating the success of implemented HACCP plans. The baseline will also provide a basis of comparison for relative abundances of invasive species during construction, as well as whether any species detected during long-term monitoring are newly introduced or were present prior to the beginning of construction. The AAFB project was completed in December 2012.

f. BTS Interdiction - JRM has established a comprehensive BTS interdiction program to ensure that military activities, including the transport of civilian and military personnel and equipment to and from Guam, do not contribute to the spread of BTS to other islands or regions. Brown treesnake interdiction requirements (e.g., trapping and inspections at ports, cargo facilities, and aircraft, inspections of household goods, biosecurity plans for training events) are specified in DoD instructions (i.e., 36 Wing Instruction 32-7004, *Brown Tree Snake Control Plan* (Appendix B) and COMNAVMAR Instruction 5090.10A, *Brown Tree Snake Control and Interdiction Plan* (Appendix C)) as well as the annual Work

Financial Plan that is developed in cooperation with USDA Wildlife Services. The Proposed Action will continue to comply with these established procedures.

In addition, as stated in the 2010 BO, the DON will fund any increase of current federally funded BTS interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced growth caused by the USMC relocation to Guam. The fiscal year (FY) 2010 level of funding for the Federal interagency BTS interdiction effort on Guam, CNMI, and Hawaii and 2010 transportation levels associated with outbound cargo from Guam for the U.S. or U.S. territories will be used as the baseline. That funding will continue and become part of the DON's BTS interdiction funding under authority of the Brown Tree Snake Control and Eradication Act (7 USC § 8501 note) (USFWS 2010a).

As stated in the 2010 BO, the DON's responsibility to fund increased interdiction measures will cease one year after the end of the fiscal year in which both USMC relocation construction has ended and the permanent non-transient USMC military units have relocated to Guam.

Since the signing of the original BO, the DON has worked with USDA and USFWS to determine BTS interdiction cost increases. To date, there has been no measurable increase in interdiction costs according to USDA.

g. Rapid Response - BTS management, research, and coordination efforts have been refined and progressed to the point where USDA APHIS WS inspection rates for cargo and flights departing Guam are almost 100% and it has been two decades since a live BTS was detected in Hawaii (Draft BTS Strategic Plan 2014). The DON fully supports implementation of BTS rapid response that is currently provided for in the MIRC Biological Opinion (USFWS 2010b).

2.4.2 Brown Treesnake Research and Suppression

The DON has initiated support for large-scale, long-term efforts to refine methods for BTS control that will reduce the snake population on a landscape level more cost-effectively and increase the efficacy of capturing snakes in low-density situations.

In early FY12, the DON coordinated with the USFWS, USDA, and U.S. Geological Survey (USGS) on priority BTS research projects. The development of a bait formulation for BTS suppression was determined to be the highest priority research need. The USDA National Wildlife Research Center (NWRC) was funded for a multi-year project by the DON at the start of FY13 to implement the bait formulation research.

The DON will continue to fund selected research/design projects identified as priorities in the Brown Treesnake Technical Working Group Strategic Plan that are compatible with the military mission on Guam for up to 10 years from the start of main cantonment construction. Dependent upon the success of current experimental suppression activities within the Habitat Management Unit (HMU) or identification of an effective alternate technology, the DON will install a BTS barrier to exclude BTS from approximately 160 acres (65 ha). If the DON is successful at eradicating BTS within the 160 acres, the DON will install a second BTS barrier to exclude BTS from approximately 300 acres (121 ha). In response to decreased BTS densities, the rodent and feral cat population is expected to increase. In order to address this anticipated increase the DON will implement rodent and feral cat control. Rodent control would benefit recovery habitat as rodents consume seeds. Feral cat control would benefit the recovery of endangered birds as cats predate on native birds. The BTS fence areas are also areas proposed for forest enhancement (Refer to Section 2.4.3 and Figures 2-13 and 2-14).

2.4.3 Forest Enhancement

One of the Conservation Recommendations in the 2010 BO was to "enhance limestone forest and ravine forest areas on DoD land currently mapped as recovery habitat for the Guam Micronesian kingfisher, Mariana crow, and Mariana fruit bat by implementing landscape-scale measures to control invasive plants." The DON is going a step further and not only controlling invasive plants but also:

- installing ungulate exclusion fencing;
- active removal of ungulates (i.e. trapping, snaring, shooting) with the goal of eradication within the fenced areas; and/or
- propagation, planting, and establishment of dominant and rare species that are characteristic of native limestone forest habitats (e.g., *A. mariannensis, G. mariannae, F. prolixa, M. citrifolia, C. micronesica, W. elliptica, S. nelsonii, H. longipetiolata, T. rotensis*).

The degradation and loss of primary limestone and other forest habitats resulting from ungulate damage and invasion by alien plant species has substantially diminished the extent of habitat for fruit bats and other species in the Mariana archipelago.

DON will implement forest enhancement commensurate to the overall amount of habitat suitable for the recovery of the species impacted. When U&SI site work or a development project (Appendix A) is initiated, a commensurate amount of forest enhancement would begin. It is expected that approximately 1,072 acres of forest will need to be enhanced as part of the Project Description (Figure 2-13).

The DON initiated an ungulate management project as part of the 2010 BO as implementation of the Ungulate Management Plan was a general conservation measure intended to contribute to the recovery of listed species. The project was the installation of approximately 4,400 ft of coated chain link fence along Route 2A on the perimeter of NBG. The fence provides an ungulate exclosure for the 3,114 ac (1,260 ha) of the main base of NBG. The fencing project is intended to effectively close off Orote pennisula from any new ungulate incursions and only entry control gates will be left unfenced. These gates are manned twenty-four hours a day/seven days a week. The fencing project was initiated in 2013 and is complete.

In 2013, USDA initiated trapping efforts in accordance with the 2010 BO. The USDA trapping efforts, are on-going and is managed by JRM. Fence maintenance will periodically be conducted in the event storm damage or other influences (i.e., corrosion) dictate repair. The ultimate goal of the project is sustained suppression to levels that allow for forest regeneration and self-sustaining populations of native animals.

Figure 2-13. Forest Enhancement at Finegayan

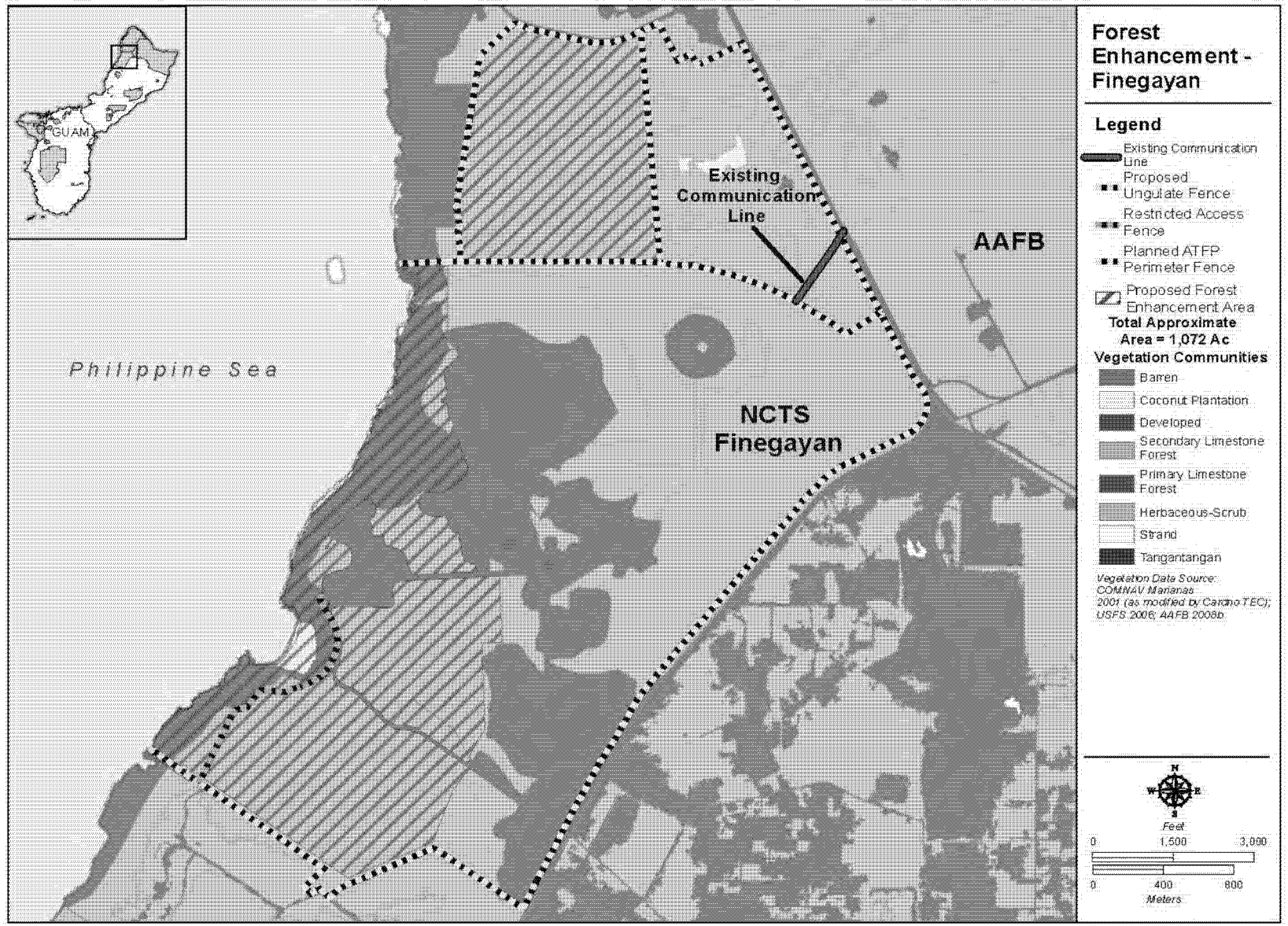
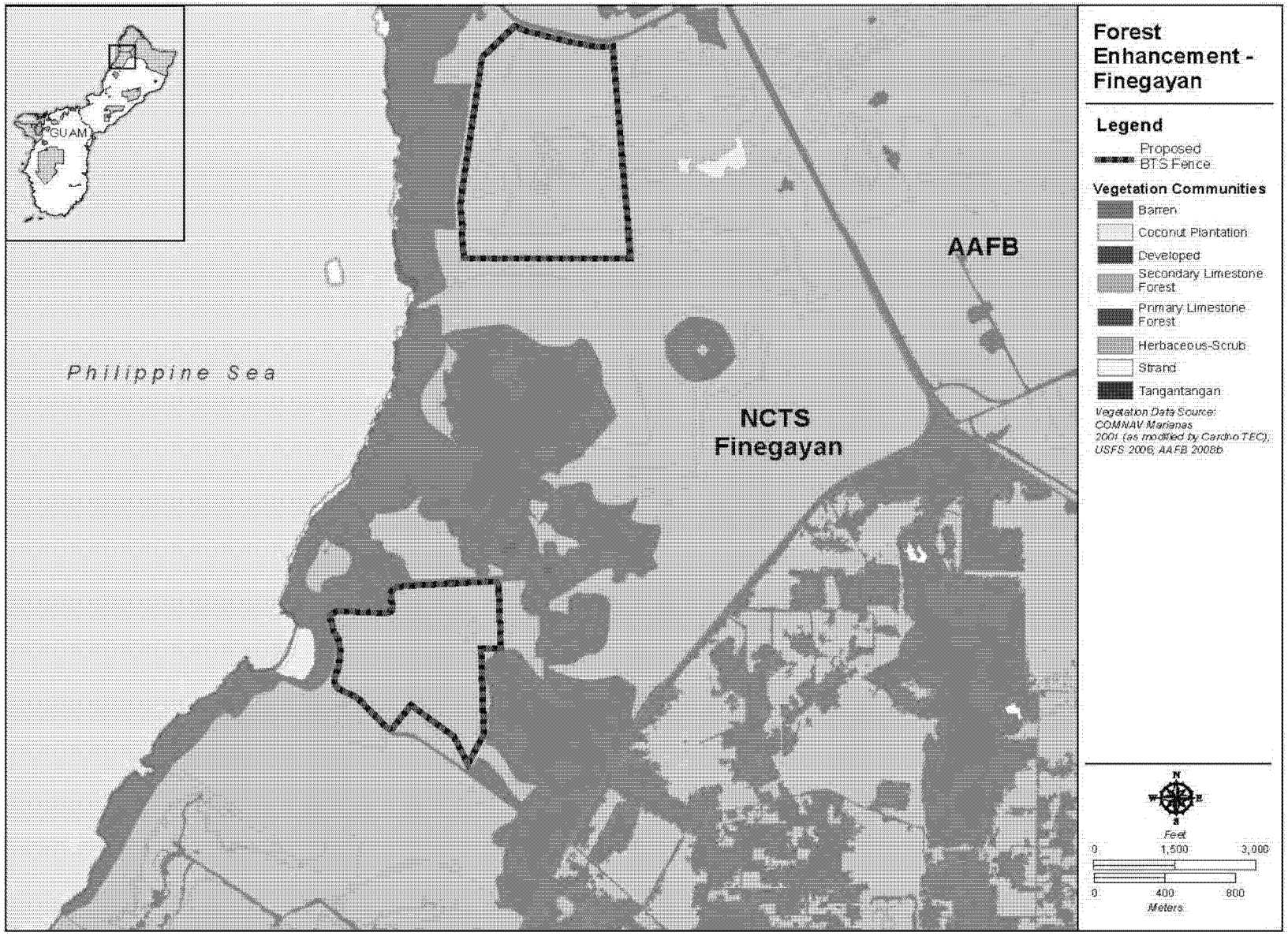


Figure 2-14. BTS Fence and Forest Enhancement - Finegayan



2.4.4 Serianthes Bracing

The one remaining adult *S. nelsonii* tree at NWF is in poor condition due to termites and rotting at the base. The tree is leaning which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon. Guide wires will be installed to support the tree at NWF thereby reducing the potential for its collapse.

In addition, the DON has included *S. nelsonii* in the list of species to be considered for propagation, planting, and establishment as part of the forest enhancement described in Section 2.4.3.

2.4.5 Sea Turtle Public Outreach

The DON, in cooperation with DAWR, has undertaken an educational program to inform military and civilian personnel about sea turtle nesting and the potential impacts to the species from nest disturbance, direct harassment of sea turtles (in the marine and terrestrial environment), beach disturbance, and other threats The DON has developed and distributed sea turtle conservation posters, tri-fold brochures and activity booklets for elementary school children. These educational materials have been distributed to local dive shops on Guam, and will continue to be used and refined throughout the construction period of the proposed relocation.

2.4.6 Mariana Fruit Bat Recovery Actions on Rota

In September of 2011, the DON awarded a cooperative agreement to the University of Montana for Mariana fruit bat recovery actions on Rota. The project focus and deliverables aligned with recovery actions contained within the Draft Revised Recovery Plan for the Mariana Fruit Bat (USFWS 2009a). Recovery actions supported by the University of Montana project included: (1) synthesizing recent research in order to update the recovery goals in the Recovery Plan, (2) conducting population genetics research using fruit bat fecal samples as a source of fruit bat DNA, (3) establishing a standardized monitoring protocol, and (4) encouraging education and involvement of local communities at multiple levels. This project was completed in June of 2013 (Mildenstein 2013).

The USFWS has indicated that the reintroduction of the currently extirpated species on Guam is reasonably certain to occur during the time frame of the Proposed Action, and as such, the DON will not plan continue with the implementation of this conservation measure but rather focus on conservation measures that improve habitat quality on Guam.

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CHAPTER 3
DESCRIPTION OF THE ACTION AREA AND THE LISTED SPECIES THAT MAY BE AFFECTED

3.1 ACTION AREA

The Action Area is defined as all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action. The 2010 BO described the Action Area as the area within which the action is likely to produce stressors that have direct or indirect adverse consequences to listed resources. The 2010 BO addressed the Action Area as DoD construction and training on Guam and Tinian. Due to the changes in the Proposed Action, the Action Area has changed and now only includes lands on Guam. The decision regarding training ranges on Tinian is not affected by the 2012 Roadmap Adjustments, and remains final and is not subject to re-analysis in the SEIS. DON intends to publish a combined Draft EIS and Overseas EIS (OEIS) for proposed CNMI Joint Military Training (CJMT) on the islands of Tinian and Pagan. Following completion of the CJMT NEPA process, the decision regarding proposed training ranges as evaluated in the CJMT EIS would supersede the 2010 ROD with regards to Tinian range projects. Consequently, the DON has deferred any implementation of the Tinian training ranges from the 2010 ROD pending the outcome of the CJMT EIS.

Key sources of information for this section include the Final SEIS, 2010 Final EIS; 2010 JGPO BO, the Joint Region Marianas (JRM) INRMP (JRM 2013), the Guam CWCS (GDAWR 2006), recovery plans (USFWS 1990a, 1993, 2005a and b, 2008a, 2009a), Federal Register (2004), and previous EISs, Environmental Assessments, BAs, and resulting USFWS BOs for recent actions on military lands on Guam. In addition, information from site-specific surveys conducted for the 2010 Final EIS (NAVFAC Pacific 2010a) and project-specific biological and wetland surveys for the SEIS (NAVFAC Pacific 2013a, 2013b, 2013c, 2013d) were used. Site-specific natural resources GIS data for the project areas were obtained from NAVFAC Pacific and NAVFAC Marianas as of April 2014.

3.2 MARIANA FRUIT BAT

Listing Status

The Guam population of the Mariana fruit bat was listed as endangered in August 1984 (USFWS 1984). In 2005, the USFWS reclassified the Mariana fruit bat from endangered to threatened status (USFWS 2005a). The reclassification was based on research indicating *Pteropus mariannus mariannus* is not a subspecies endemic only to Guam but the Guam population is part of a subspecies including bats on other islands that interact with each other (USFWS 2005). A five-year status review was completed in 2012 (USFWS 2012a) and a draft revised recovery plan for the Mariana fruit bat was completed in 2009 (USFWS 2009a).

Critical Habitat

In October 2004, approximately 376 ac (152 ha) of USFWS lands were designated as critical habitat for the fruit bat within the Ritidian Unit of the GNWR (USFWS 2004a).

Primary Constituent Elements (PCE)

In accordance with section 3(5)(A)(i) of the ESA and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, the USFWS is required to consider those physical and biological

features that are essential to the conservation of the species and that may require special management considerations or protection. Such features are termed ''primary constituent elements'' and include, but are not limited to: space for individual and population growth and for normal behavior; food, water, air, light, minerals and other nutritional or physiological requirements; cover or shelter; sites for nesting and rearing of offspring; and habitats that are protected from disturbance and are representative of the historical, geographical and ecological distributions of the species.

In the final rule for designating critical habitat for the Mariana fruit bat, the USFWS identified the primary constituent elements required by the Mariana fruit bat for the biological needs of foraging, sheltering, roosting, and rearing of young as being found in areas supporting limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native and introduced plant species (USFWS 2004a). These forest types provide the primary constituent elements of:

(1) Plant species used for foraging, such as breadfruit, papaya, fadang, fig, kafu, coconut palm, and talisai; and

(2) Remote locations, often within 328 ft (100 m) of clifflines that are 260 to 590 ft (80 to 180 m) tall, with limited exposure to human disturbance and that contain mature fig, chopak, gago, pengua, panao, fagot, and other tree species that are used for roosting and reproductive activity.

Recovery Habitat

Unlike recovery plans or critical habitat which are discussed in the ESA and involve public notice and publication in the Federal Register, "recovery habitat" is a term that was defined in the 2010 BO by the USFWS to mean "habitat that is currently suitable to support the recovery of listed species." For the fruit bat, the USFWS identified recovery habitat as including the following vegetation communities for foraging, roosting, and breeding: primary and secondary limestone forest, coconut plantation, ravine forest, and groves of ironwood (based on vegetation mapping by the U.S. Forest Service (USFS) (2006)). According to the 2010 BO, a total of 29,308 ac (11,860 ha) of Mariana fruit bat recovery habitat remains on Guam (Figure 3-1).

Threats

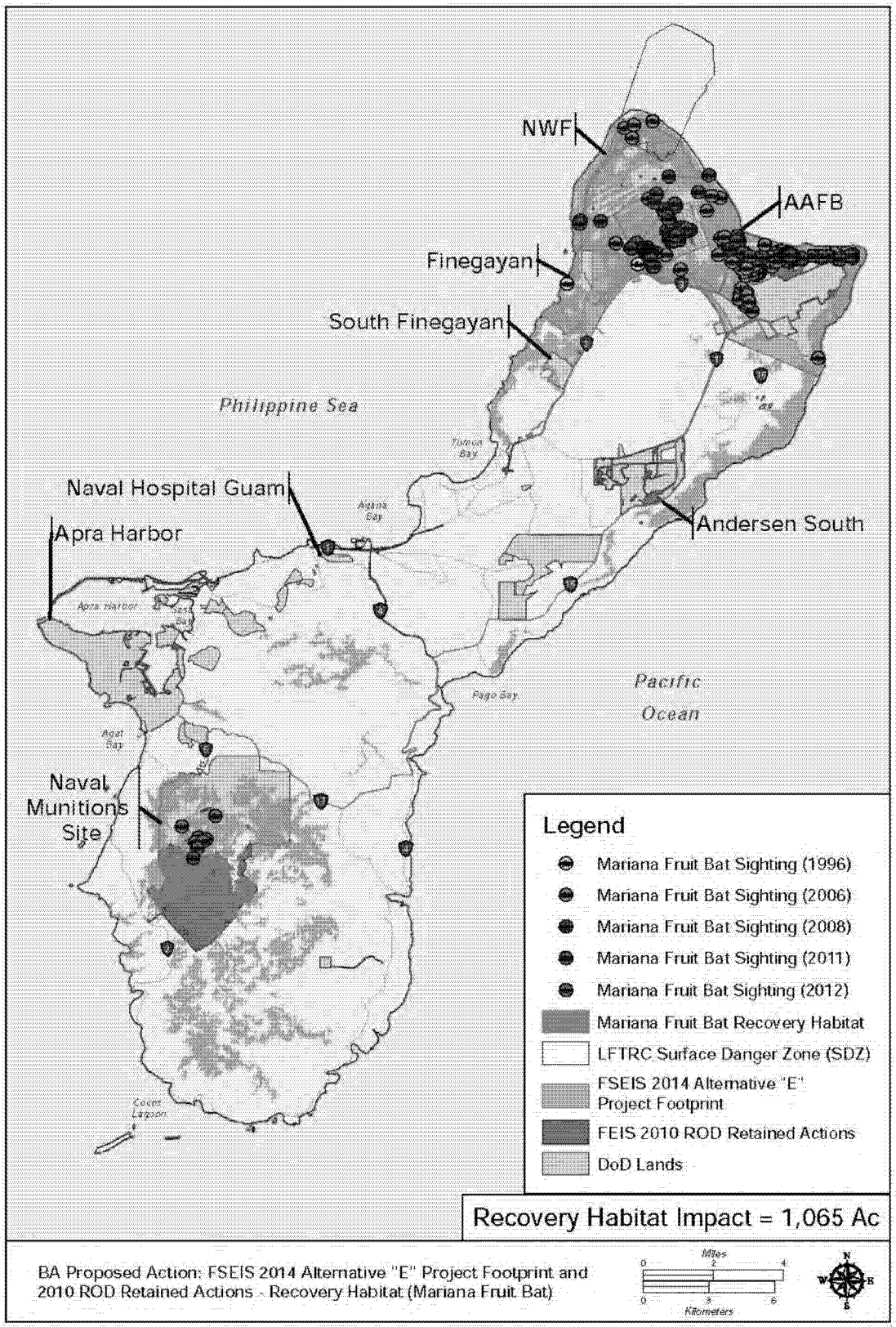
The primary threats to the Mariana fruit bat throughout its range are illegal hunting and habitat destruction by volcanic eruptions and man-made disturbances. Illegal hunting and predation from BTS are widely accepted as reasons for lack of fruit bat recovery on Guam (USFWS 2009a). Consumer demand remains the driving force for illegal hunting and has prevented the recovery of fruit bats in the southern CNMI (Brooke 2008).

Distribution

On Guam, the sighting of Mariana fruit bat was considered to be "not... uncommon" in 1920 (Crampton 1921 in USFWS 2009a). However, by 1931 bats were uncommon on Guam, possibly because the introduction of firearms led to more hunting (Coultas 1931). In 1958, the Guam population was estimated to number no more than 3,000. This estimate had dropped to between 200 and 750 animals by 1995.

Mariana fruit bat population estimates on Guam in 2006 indicated fewer than 100 individuals (Janeke 2006). In 2009, the number of fruit bats on Guam was estimated to be less than 50 individuals (USFWS 2009a). Of the estimated 6,610-6,930 total Mariana fruit bat individuals, fewer than 20 occur on Guam, with the remaining occurring within the CNMI (USFWS 2010a). Other than a few isolated periods of increase, fruit bats have been in long-term decline on Guam (USFWS 2009a), in response to a combination of threats.

Figure 3-1. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Mariana Fruit Bat)



Extensive surveys conducted throughout AAFB between December 2010 and December 2011 resulted in a conservative estimate of approximately 25 fruit bats (JRM *et al.* 2012a). Only 50 detections of individual bats were recorded during 84 station count surveys from March through September 2012, and no active fruit bat aggregation or colony site was discovered (JRM *et al.* 2012b). There were observations of single flying and (in a few cases) roosting fruit bats in three general regions on AAFB: the cliffline extending from above the Combat Arms Training and Maintenance (CATM) Range east to Pati Point; in or near the Munitions Storage Area (MSA); and in the vicinity of the Habitat Management Unit (HMU) (JRM *et al.* 2012a) (Figure 3-1). The most recent base-wide fruit bat counts were conducted on AAFB on July 3, 2014. The counts were coordinated by Dr. Tammy Mildenstein and there were approximately 90 observers at 50 survey stations. Less than 10 bats were sighted at six stations. The area covered represents 13% of the forested habitat on AAFB.

Between 1984-2003, the number of bats at Pati Point reached a high of 700 bats. This colony has undergone dramatic short-term fluctuations in the past indicating that members of the colony may be able to migrate easily between Rota and Guam (COMNAV Marianas 2001b). Surveys conducted from June 2007 through April 2008 recorded 31-54 individuals with an average of 40 (AAFB 2008d). Fifty-three survey counts at Pati Point colony site from 24 December 2010 to November 2011 had an average of 2.2 bats. Counts of solitary bats throughout the forest of AAFB did not locate other colonial roost sites. As of 2011, no new fruit bat colonies have been recorded anywhere on Guam (JRM 2012b and c). Tarague Basin is a major conduit for Mariana fruit bat travel between the main Pati Point colony and foraging areas at NWF, Ritidian Point, and portions of the AAFB. Recent surveys of the number of fruit bats at the Pati Point colony have indicated very low (less than 5 bats in 2011 (JRM 2012b and c)) attendance, indicating this colony site is no longer being used.

From 2010 through November 2013, there have been five reports of one to three fruit bats in flight at the GNWR. GNWR personnel believe that fruit bats may roost near Star Cave at Ritidian Point on GNWR property (Personal communication via email from Jennifer Cruce, GNWR to Anne Brooke, JRM, November 7, 2013).

The Haputo ERA contains some of the best remaining fruit bat habitat on the DON-managed lands (NAVFAC Marianas 2010a; JRM 2013). As fruit bats are known to travel 6-7.5 miles (10-12 km) to reach forage areas (USFWS 1990), it is possible that fruit bats from AAFB may occasionally use Finegayan, primarily forested areas adjacent to the Haputo ERA, for foraging, and possibly roosting. In 2008, during 10 observation days, one sighting was reported in the Haputo ERA and one in the northeastern portion of Finegayan (Brooke 2008). There are no known colonial roost areas at Finegayan.

In May and June of 2012 seven separate detections of a single Mariana fruit bat were recorded during overlook surveys conducted on six separate occasions at four locations throughout the proposed range areas on Naval Magazine (NAVMAG). It could not be determined whether these observations represented a single individual or multiple individuals. It is possible that all sightings were of the same individual fruit bat observed on different occasions or at different locations.

The Mariana fruit bat is rarely observed at NBG. One bat was sighted on NBG lands in 2008 during 90 hours of fruit bat surveys at 14 survey locations on or near NBG lands.

3.3 MARIANA CROW

Listing Status

The Mariana crow was federally listed as endangered on August 27, 1984 (USFWS 1984) and was consider extirpated from Guam in 2011 (USFWS 2013b). A five-year status review was completed in 2007 (USFWS 2005b) and a draft revised recovery plan for the Mariana crow was completed in 2005 (USFWS 2005b).

Critical Habitat

The USFWS designated 376 acres of critical habitat for the Mariana crow (*Corvus kubaryi*) on the island of Guam and approximately 6,033 ac (2,442 ha) on the island of Rota in the Commonwealth of the Northern Mariana Islands (USFWS 2004a) in October 2004.

Primary Constituent Elements

The primary constituent elements required by the Mariana crow for the biological needs of foraging, sheltering, roosting, nesting, and rearing of young are found in areas that support limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native and introduced plant species (USFWS 2004a). These forest types provide the primary constituent elements of:

(1) Emergent and subcanopy trees with dense cover for breeding such as fagot, pengua, ifit, ahgao, aabang, fig, yoga, and faniok;

(2) Sufficient area of predominantly native limestone forest to allow nesting at least 950 ft (290 m) from the nearest road and 203 ft (62 m) from the nearest forest edge and to support Mariana crow breeding territories (approximately 30 to 91 ac (12 to 37 ha)) and foraging areas for non-breeding juvenile crows; and

(3) Standing dead trees and plant species for foraging, maypunayo, breadfruit, coconut palm, fagot, pago, ifit, tangantangan, langiti, kafu, ahgao, fig, and yoga.

Recovery Habitat

According to the 2010 BO, only limestone forest and ravine forest are considered habitat that is currently suitable to support the recovery of listed species.

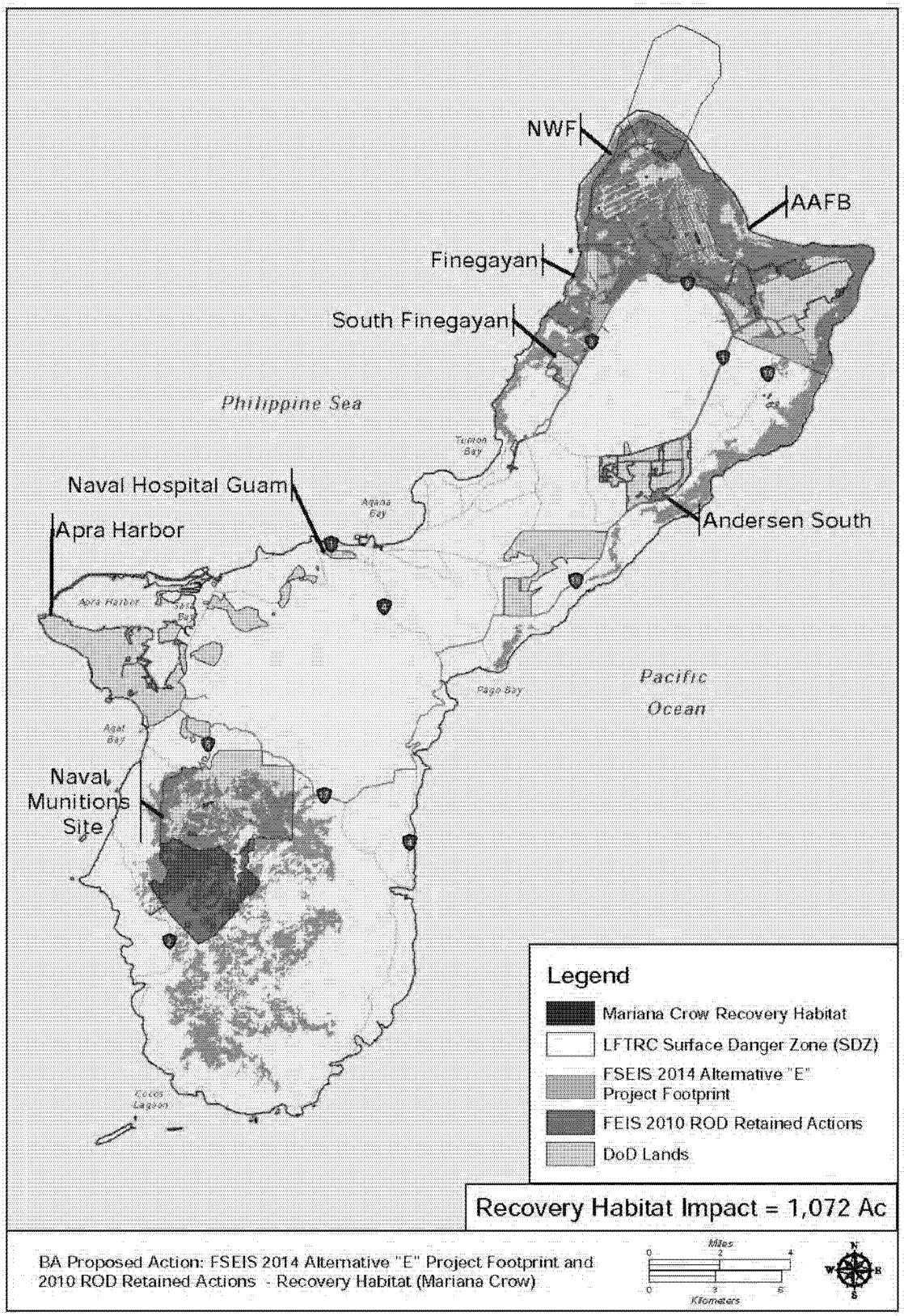
The USFWS estimated there were approximately 14,831 ac (6,002 ha) of potential recovery habitat for the Mariana crow in northern Guam and 11,819 ac (4,783 ha) in southern Guam (USFWS 2010a) (Figure 3-2). A total of 286 ac (116 ha) of recovery habitat currently exists within the 376-ac area designated as critical habitat for this species.

Threats

Primary threats to the Mariana crow throughout its range are habitat destruction and modification, predation by introduced predators such as cats, rats, mangrove monitor lizards (*Varanus indicus*), and BTS, human persecution, typhoons, and reproductive and small population problems (USFWS 1984, USFWS 2005b).

Brown treesnake predation is believed to be the overriding factor in the decline of Mariana crow on Guam (USFWS 2005b). Habitat degradation due to grazing by feral ungulates and range expansion of invasive plants are also factors (USFWS 2005b).

Figure 3-2. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Mariana Crow)



Distribution

The Mariana crow is considered extirpated in the wild on Guam (USFWS 2013b). The closest population of crows is on the island of Rota, approximately 56 miles (90 km) north of Guam.

3.4 GUAM MICRONESIAN KINGFISHER

Listing Status

The Guam Micronesian kingfisher was listed as endangered in 1984 (USFWS 1984), and was considered extirpated from the wild by 1988 (Wiles et al. 2003). A draft revised recovery plan for the Guam Micronesian kingfisher was completed in 2009 (USFWS 2008a). A five year status review was completed in March of 2012 (USFWS 2012a).

Critical Habitat

Critical habitat for the Guam Micronesian kingfisher was proposed in June of 1991 (USFWS 1991a) and withdrawn in April of 1994 (USFWS 1994). In October 2004, approximately 376 ac (152 ha) of USFWS lands were designated as critical habitat for the Guam Micronesian kingfisher within the Ritidian Unit of the GNWR (USFWS 2004a).

Primary Constituent Elements

In the 2004 final rule for designating critical habitat for the Guam Micronesian kingfisher, the USFWS identified the primary constituent elements required for the Guam Micronesian kingfisher for the biological needs of foraging, sheltering, roosting, nesting, and rearing of young as being found in areas that support limestone, secondary, ravine, swamp, agricultural, and coastal forests containing native and introduced plant species (USFWS 2004a). These forest types include the primary constituent elements of:

(1) Closed canopy and well-developed understory vegetation; large (minimum of approximately 17 in (43 cm) dbh), standing dead trees (especially faniok, umumu, breadfruit, fig, and coconut palm); mud nests of *Nasutitermes* spp. termites; and root masses of epiphytic ferns for breeding;

(2) Sufficiently diverse structure to provide exposed perches and ground surfaces, leaf litter, and other substrates that support a wide range of vertebrate and invertebrate prey species for foraging kingfishers; and

(3) Sufficient overall breeding and foraging area to support kingfisher territories of approximately 25 ac (10 ha) each.

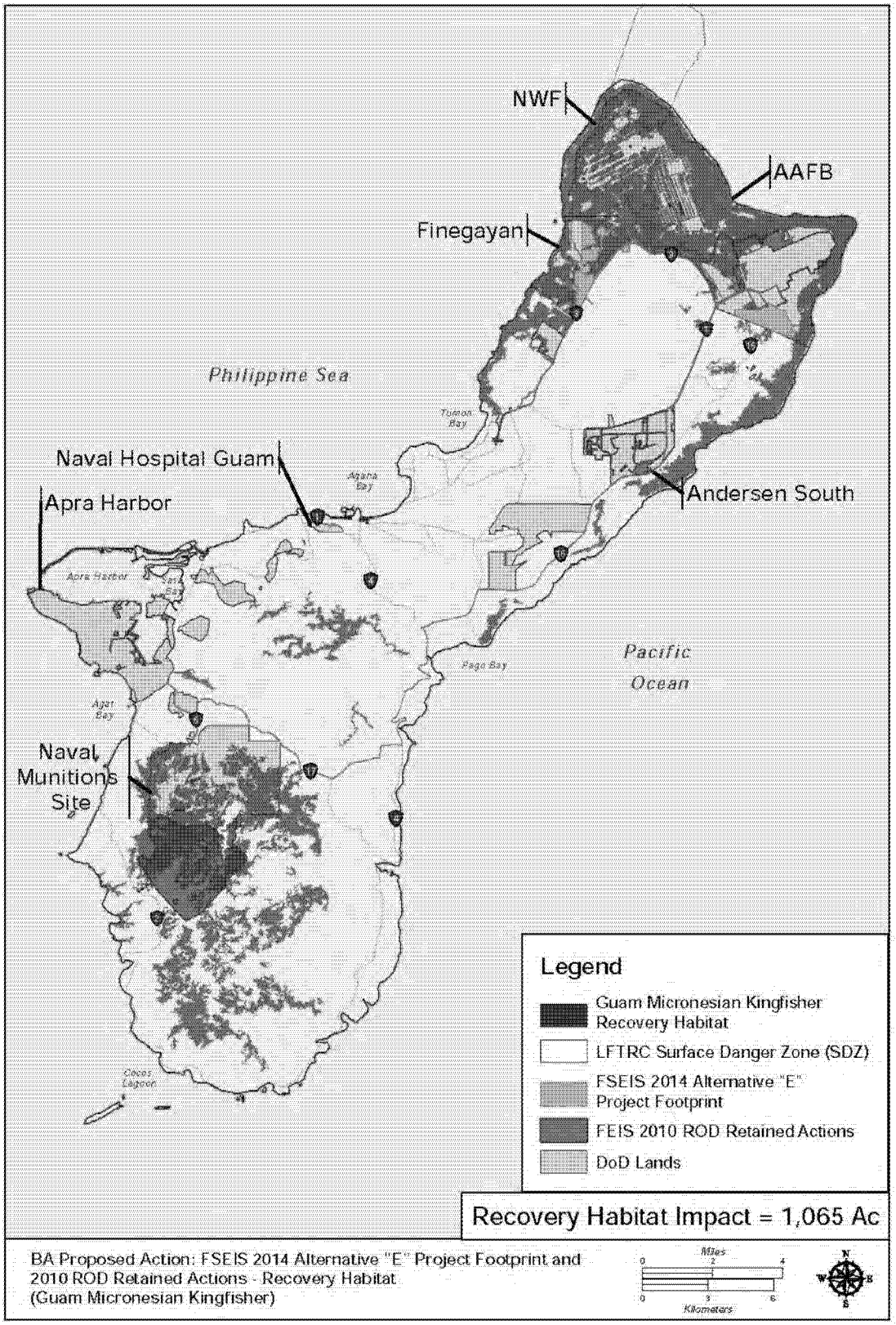
Recovery Habitat

According to the 2010 BO, limestone forest, ravine forest, coconut plantation, and palma brava grove are considered likely habitat to support Guam Micronesian kingfisher recovery. A total of 286 ac (116 ha) of recovery habitat currently exists within the 376-ac area designated as critical habitat for this species. A total of 29,310 ac (11,861 ha) of Guam Micronesian kingfisher recovery habitat remains on Guam (Figure 3-3).

Threats

When the kingfisher was first listed in 1984, disease was believed to be the primary threat to the species on Guam (USFWS 1984). Since that time predation by the BTS has been identified as the primary threat (Savidge 1987).

Figure 3-3. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Guam Micronesian Kingfisher)



Primary threats to kingfishers include: low productivity in captive propagation; incremental habitat loss due to development and fire; habitat degradation from feral ungulate browsing and trampling; and predation risk from BTS (USFWS 2008a). Currently, the high density of BTS is the primary factor preventing the kingfisher's survival and recovery on Guam.

Distribution

The Guam Micronesian kingfisher was considered extirpated from the wild by 1988 (Wiles et al. 2003). The species is only known to occur in mainland zoos.

3.5 GUAM RAIL

Listing Status

The Guam rail was emergency listed as endangered on April 11, 1984. On August 27, 1984, the final rule listing the Guam rail as endangered was published (USFWS 1984). A non-essential experimental population was proposed on Rota on June 19, 1989 and the final rule published on October 30, 1989. A recovery plan covering native forest birds of Guam and Rota was prepared in 1990 (USFWS 1990b).

Critical Habitat

There is no critical habitat designated for the Guam rail.

Recovery Habitat

The Guam rail prefers edge habitats, especially grassy or secondary vegetation areas which provide good cover; mature forest is deemed only marginal for the Guam rail (USFWS 1990b). Scrub forest, other shrubs and grasses, and urban cultivated are considered primary Guam rail habitat because they include shrubby edge habitat.

The 2010 BO estimated 24,698 ac (9,995 ha) of Guam rail recovery habitat available in the north of Guam and 24,866 ac (10,063 ha) in the south (Figure 3-4).

Threats

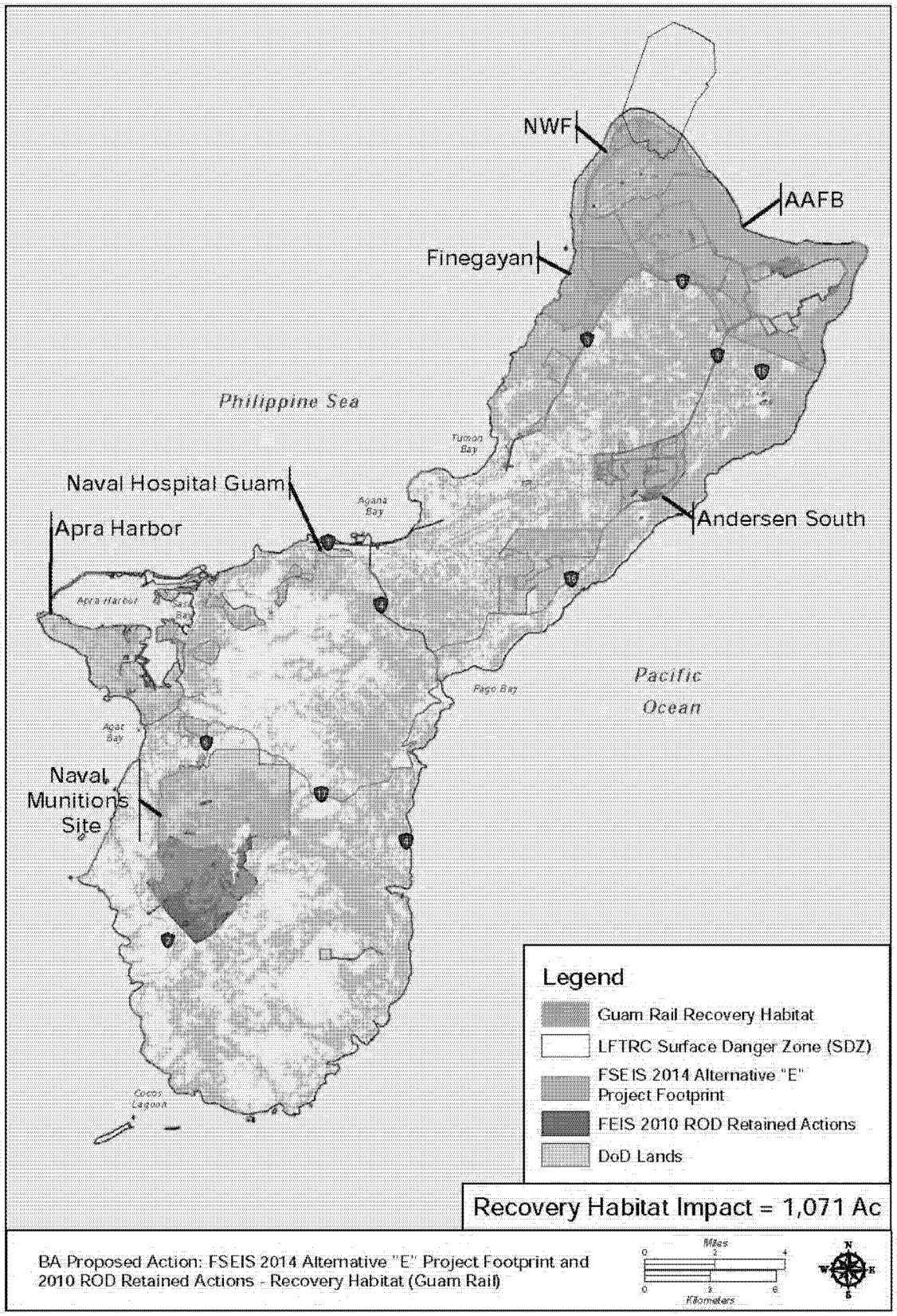
While the loss of habitat likely played a part in the extirpation of the Guam rail from Guam, several species of predators have been introduced to the Mariana Islands including feral dogs, cats, three species of rats (*Rattus exulans, R. rattus, and R. norvegicus*), a monitor lizard, and the BTS. However, the primary reason for extirpation is believed to be from predation by cats and BTS. These are the two known threats that preclude the successful reestablishment of the Guam rail on Guam (USFWS 1990).

Distribution

The Guam rail was believed to have been extirpated in the wild on Guam by 1987 (Wiles et al. 1995) and exists primarily in captivity on Guam and in mainland zoos.

The Cocos Island Resort, Guam Department of Agriculture, and USFWS entered into an agreement to create a safe harbor for the Guam rail on Cocos Island in 2009. In November 2010, 16 Guam rails were released on Cocos Island, a 81 acres (33 ha) atoll one mile off the coast of the southern tip of Guam, as part of its reintroduction two decades after its extinction in the wild.

Figure 3-4. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Guam Rail)



3.6 MARIANA GRAY SWIFTLET

Listing Status

The Mariana gray swiftlet was listed as endangered on August 27, 1984. A five-year status review was completed in 2013 (USFWS 2013c). A recovery plan for Mariana gray swiftlet was completed in September of 1991 (USFWS 1991b).

Critical Habitat

No critical habitat rules have been published for the Mariana gray swiftlet.

Recovery Habitat

The 2010 BO did not identify recovery habitat for Mariana gray swiftlet.

Threats

The 1991 recovery plan for the Mariana gray swiftlet stated "Current information documents the decline of Mariana gray swiftlet populations on the islands of Guam, Rota, and possibly Saipan. Yet for none of these islands is there direct evidence of factors causing the recent decline."

The 2010 BO stated "The restricted distribution of Mariana swiftlets, along with its small population size and dependence on caves, makes the species vulnerable to threats. The causes for the decline of Mariana swiftlets are mostly unknown, but human disturbance, predation, pesticides, and disease have all been hypothesized as having a role. Swiftlets have been documented to flush or fail to enter their caves when humans are near or within their caves (Wiles and Woodside 1999). Their sensitivity to human presence has resulted in injuries to chicks and adults and could result in damage to eggs (Wiles and Woodside 1999). Sources of human disturbance have included Japanese soldiers during World War II, guano mining, hunters, hikers, and vandalism. While the introduction of brown treesnake is known to have caused the extirpation of many bird species in Guam and CNMI, it is not known whether it has significantly affected swiftlets. Brown treesnake predation on Mariana swiftlets is considered to be a regular event and only those birds able to find nest or roost sites on high, smooth walls and ceilings are able to avoid snake predation. The use of pesticides such as DDT has been suspected of causing the decline of swiftlet populations on Guam (Diamond 1984, p. 452), but the concentrations of pesticide residues found in swiftlet guano have not supported this hypothesis (Grue 1985, p. 301). On Saipan, non-native cockroaches are known to destroy swiftlet nests by consuming the saliva that holds the nests to the walls or ceilings (Cruz et al. 2008, p. 242). Savidge (1986, p. 9) investigated the role of disease in the decline of birds on Guam and found that there is no evidence that it has played a significant role. The typhoons that frequently occur in the area may cause periodic declines in swiftlet populations, but are not expected to threaten the species as a whole since the species has survived numerous such events during its evolutionary history (USFWS 1991b, p. 22)."

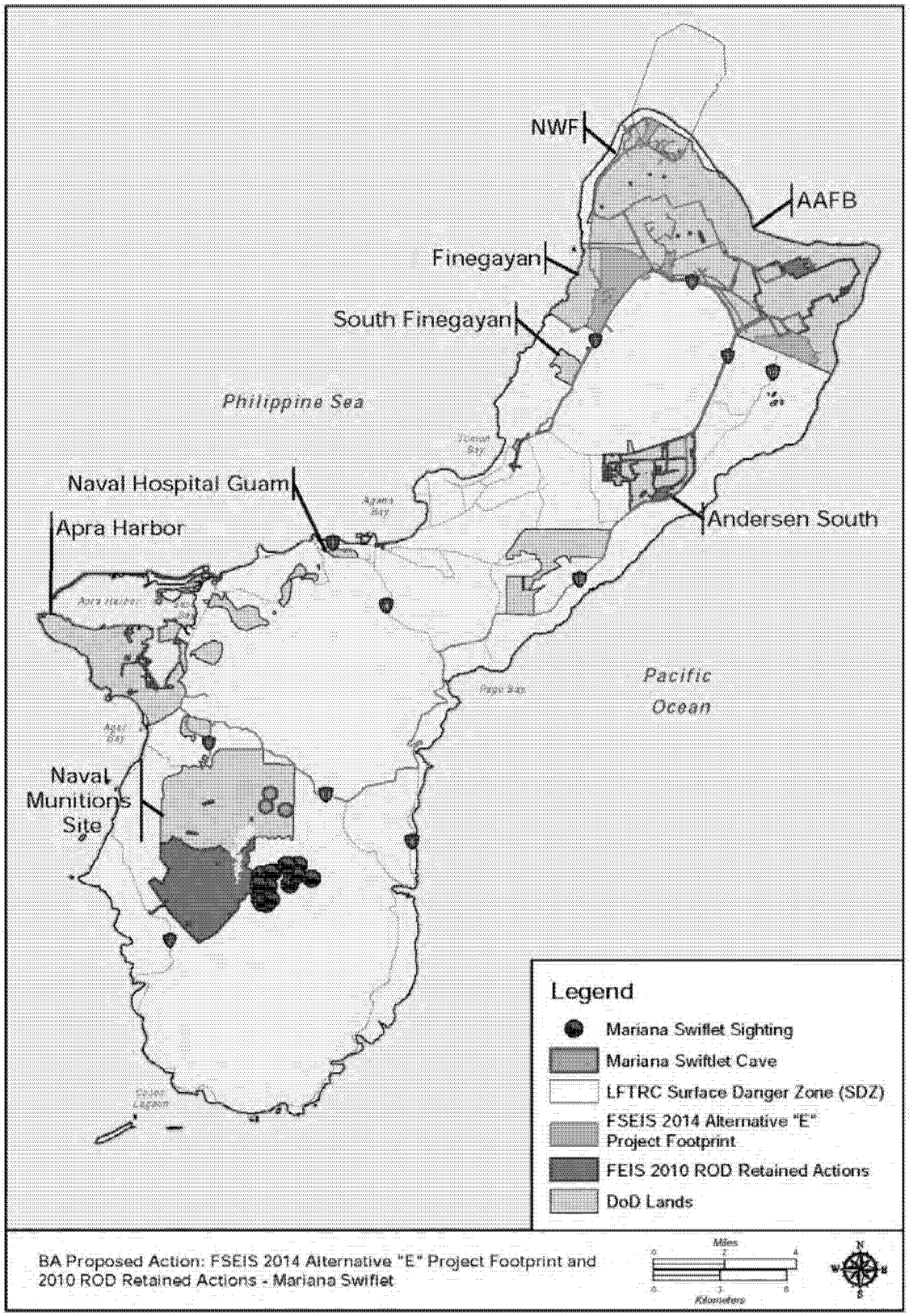
Distribution

The Mariana gray swiftlet is endemic to Guam and the four southern islands of CNMI (Cruz et al. 2008). A population also became established on Oahu, Hawaii, between 1962 and 1965 (Wiles and Woodside 1999, p. 57). Most historical information on the species comes from Guam, where it was reported as being common and the third most abundant species seen during roadside counts, but declined to approximately its current levels by the late 1970s (USFWS 1991b). The total number of Mariana gray swiftlets occurring within its historical range is approximately 6,800 individuals and it currently occurs on Guam (in three known caves within the NMS, Aguiguan (in nine known caves), and Saipan (ten known caves), and is considered extirpated from Tinian and Rota.

Mariana gray swiftlets nest and roost in caves and leave the caves during the day to forage over a wide variety of terrain and vegetation, favoring ridge crests and open grassy areas where they capture small insects while flying (USFWS 1991b). There are only three known nesting/roosting caves (Mahlac, Fachi, and Maemong) on Guam for this species and they are located in the northern NAVMAG (Figure 3-5). The number of Mariana gray swiftlets at Mahlac cave fluctuates around 1,000, while the number at Maemong cave from 2010 to 2012 ranged between 40 and 126, and at Fachi cave have fluctuated between a low of 3 (2011) and a high of 172 (2009) (Brindock 2012). A nest/roost cave previously used by Mariana gray swiftlets is known from Ritidian Point, but this cave was abandoned by the late 1970s (USFWS 1991b). Biological surveys conducted in 2008 and 2009 in support of the 2010 Final EIS and in 2012 and 2013 in support of this SEIS, did not record any incidental observations of Mariana gray swiftlets (NAVFAC Pacific 2010, 2013b; UoG 2014).

During June and July 2012, surveys within the proposed non-federal lands range area near NAVMAG observed 1-11 Mariana gray swiftlets at multiple locations from four survey stations (NAVFAC Pacific 2013a).

Figure 3-5. FSEIS and 2010 ROD Related Actions – Mariana Gray Swiftlet Locations



3.7 SERIANTHES NELSONII

Listing Status

Serianthes nelsonii was listed as threatened on March 4, 1987. A five-year status review was completed in 2010 (USFWS 2010c). A recovery plan for *Serianthes nelsonii* was completed in February of 1994 (USFWS 1993).

Critical Habitat

There is no critical habitat designated for the *Serianthes nelsonii*.

Recovery Habitat

The 2010 BO did not include recovery habitat for *Serianthes nelsonii*. However, as part of the 2010 consultation, the USFWS provided the DON with digital files depicting recovery habitat for *Serianthes nelsonii*. The digital files indicate there are approximately 11,668 ac (4,722 ha) of habitat on Guam suitable for *Serianthes nelsonii* (Figure 3-6). To date, the recovery plan for the species has not been updated to reflect the criteria for recovery of the species.

Distribution

There is only one known remaining mature seed-bearing tree on Guam and it is in the NWF area above Ritidian Point within primary limestone forest (Figure 3-7).

In 2012, JRM funded a study by UoG to monitor the mature seed bearing tree. The study indicated the tree is leaning much more in recent years, which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon. Mealy bug infestations were routinely evident upon inspection of leaf litterfall. *Eurema* adult butterflies were persistently observed within the canopy (U.S. Navy 2014). The UoG study monitored seedling emergence and growth beneath the mature *S. nelsonii* tree. Of the 488 seedlings that emerged and died during the course of the project, only four seedlings exhibited lifespan greater than 200 days. Past reports have indicated deer browsing was the major cause of *in situ* seedling death. Strict maintenance of the functional exclusion fence was sustained throughout the study, so deer or pig damage could not have been responsible for the mortality of the 488 seedlings that emerged and died during the study. Also, there was no seasonal pattern that could explain the extraordinary lifespan of these four seedlings.

Two outplanted *Serianthes* saplings are located in the Tarague basin area approximately 4 miles (6.4 km) east of the proposed LFTRC and six outplanted *Serianthes nelsonii* saplings are located in the GNWR that are approximately 1,640 ft (500m) west of the one known remaining mature seed-bearing tree on Guam (J. Schwagerl, personal communication, June 23, 2014).

Figure 3-6. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Serianthes nelsonii)

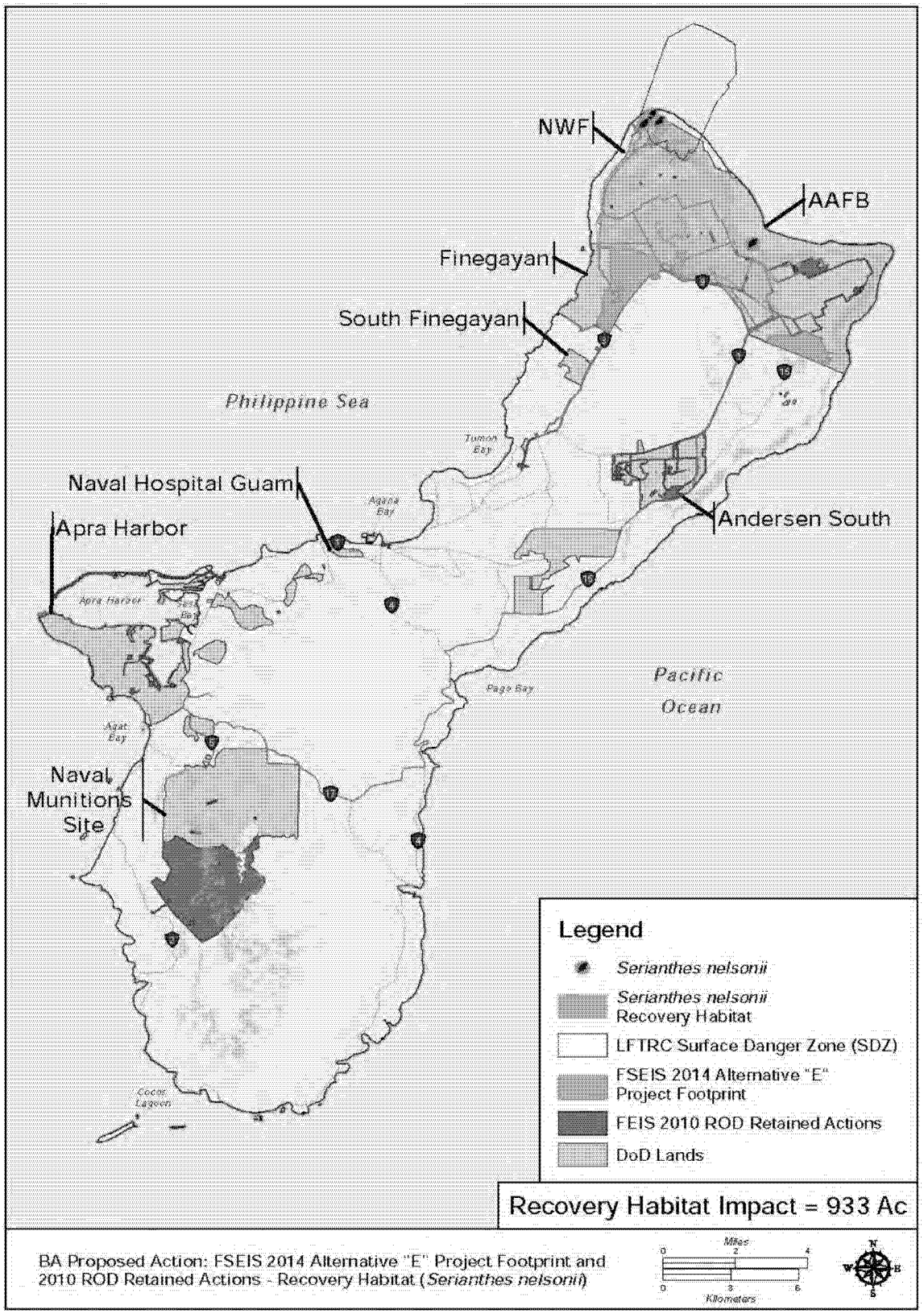


Figure 3-7. Mature Serianthes nelsonii (Photo by Coralie Cobb, May 2014)

3.8 GREEN AND HAWKSBILL SEA TURTLES

Listing Status

The green sea turtle was listed as threatened on July 28, 1978. The hawksbill sea turtle was listed as endangered June 2, 1970 (USFWS 1970). Recovery plans for the green and hawksbill sea turtle were completed in 1998 (USFWS 1998a and b).

Critical Habitat

There is no critical habitat designated for the green or hawksbill sea turtles on Guam.

Recovery Habitat

The 2010 BO did not include recovery habitat for green or hawksbill sea turtles.

Threats – Terrestrial

Threats to the green sea turtle on nesting grounds are representative of those also faced by hawksbill sea turtles. Storm events, including typhoons, may destroy nests because of flooding or piling of eroded sand on the nest site. Beach erosion due to wave action may decrease the availability of suitable nesting habitats and result in a decline in the nesting rate. A number of non-native and native predators dig into nests and prey upon incubating eggs, while some predators, including birds, may take hatchlings just prior to or during their emergence from nests.

Human crowding of nesting beaches can disturb nesting females and prevent laying of eggs. Flashlight use, beach fires, and artificial lighting on human structures may deter females from coming up onto a beach or may disorient hatchlings as they emerge from nests and try to find the sea (Witherington and

Martin 1996). Emerging hatchlings may respond to artificial lighting by moving in the wrong direction (*misorientation*) or becoming disoriented and moving in circles. Both behaviors can result in hatchling mortality through exhaustion, dehydration, predation, and other causes (Mann 1977; Witherington and Martin 1996).

An increased human presence may lead to an increase in the presence of domestic pets (which can depredate nests) and may lead to an increase in litter (which may attract wild predators). Trampling can increase sand compaction, which may damage nests or hatchlings. Humans may also introduce exotic vegetation in conjunction with beach development that can overrun nesting habitat or make the substrate unsuitable for digging nest cavities.

One of the most substantial threats to nesting sea turtles in the Pacific Islands remains the illegal poaching of adults and eggs (NMFS and USFWS 1998a). The direct harvest of adult nesting females can increase the rate of local extinction. Harvesting of eggs reduces the chance that recruitment will replace the reduced breeding population.

Distribution

As described in the 2010 Final EIS, green sea turtles forage in offshore waters and nest on beaches at AAFB. The majority of nesting by this species occurs in northern Guam. Historically, the EOD beach at AAFB has one of highest incidents of sea turtle nesting.

Green sea turtles are known to nest on the following Guam beaches: Waterfront Annex of NBG Kilo Wharf area, Spanish Steps, AAFB (Tarague Beach, Sirena Beach, Pati Point), Guam National Wildlife Refuge, Haputo area (Wusstig 2009, pers. comm.; Grimm and Farley 2008). Nesting activity on Guam occurs throughout the entire year with a peak in nesting between April and July (Grimm and Farley 2008).

The green sea turtles potentially nest along the Haputo ERA beach. Two suspected nest attempts and two false crawls were documented between 2008 and 2010 at Haputo Beach (Grimm and Farley 2008). No sea turtle activity was observed at Haputo beach during 51 beach surveys from October 2010 through August 2012 (NAVFAC Marianas 2011; Brindock 2012). Green sea turtle nesting is documented on AAFB at Tarague.

Between 1991 and 1994, hawksbill sea turtles nested in Sumay Marina, Guam, during varying months including October, December, February, and March (Wusstig 2009, pers. comm.). On Guam, the population is thought to be declining, and fewer than ten females are expected to nest per season (NMFS and Service 2007b). Hawksbill sea turtles are frequently sighted in the near-shore waters surrounding Guam (Grimm and Farley 2008). Hawksbill sea turtles were reported nesting in June and July at Tarague Beach, Guam; however, this is based on only one year of data (Wusstig 2009, pers. comm.). It has been observed offshore of Finegayan but there have been no known nesting attempts by this species at Haputo Beach (JRM 2013). Green sea turtle nesting is documented on the GNWR in the area of the proposed SDZ for the LFTRC. The hawksbill sea turtle has not been definitively determined to nest on Guam in recent years (JRM 2013).

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CHAPTER 4 ANALYSIS OF POTENTIAL EFFECTS TO FEDERALLY LISTED SPECIES

4.1 APPROACH TO ANALYSIS

This chapter presents an analysis of potential direct and indirect effects on federally listed species, critical habitat and habitat suitable for recovery of listed species from implementation of the Proposed Action. Potential activities that may affect such species, critical habitat and habitat suitable for recovery include construction and operation of facilities and ranges. Direct effects are the direct or immediate effects of the project on the species or its habitat. Direct effects resulting from the Proposed Action including the effects of interrelated actions and interdependent actions. Indirect effects are those that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur (e.g., attraction of predators due to development and human presence). All direct and indirect project effects on listed species, critical habitat and habitat suitable for recovery have been further classified and evaluated based on their anticipated longevity (i.e., temporary or permanent effects). Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, and interdependent of, that action. Interrelated actions are those that are part of a larger action and depend on the larger action for its justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

As they relate to the federally listed species, critical habitat and habitat suitable for recovery of federally listed species considered in this BA, direct and indirect effects from proposed activities within the Action Area have been evaluated herein based upon: (1) an understanding of the methods and equipment that would be used during construction and operation of facilities, (2) knowledge of the potential for such methods and equipment to disturb the natural resources on which the subject species depend, and (3) awareness of the types of effects that have resulted from similar actions in the past.

Stressors of the Proposed Action

Stressors associated with proposed construction and operation of facilities associated with the Proposed Action were identified based on previous consultations, particularly the formal consultation process for the MIRC EIS/OEIS and the JGPO FEIS and resulting BO's.

4.2 POTENTIAL EFFECTS TO THE MARIANA FRUIT BAT

Construction Noise

Construction noise is generated by the use of heavy equipment on job sites and is short-term in duration (i.e., the duration of the construction period). Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. For a single point source, like a construction bulldozer, the sound level decreases by approximately 6 decibels (dBs) for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about 3 dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels varies.

Among mammals, bats are one of the orders that has the most diverse hearing and vocalization ranges. This is attributable to the fact that some bats use echolocation, which is comprised of high frequency sound, to forage and navigate while other bats do not use echolocation and communicate through mid-frequency sound. Bats in the genus Pteropus, including the Mariana fruit bat, do not use echolocation.

There is less scientific literature on the hearing and vocalizations of non-echolocating bats, which often eat fruit or blossoms. From the limited reporting in the literature it appears that these species tend to fall within the same functional hearing group, which can be generally described as being most sensitive to frequencies between 10 and 20 kHz, insensitive to frequencies below 1 kHz, and able to detect frequencies 40 kHz or greater (Calford, Wize et al. 1985, Calford and McAnally 1987, Heffner, Koay et al. 2006).

Figure 4-1 provides the audiogram for two species of *Pteropus* and humans. It is clear from the audiogram that the flying foxes do not have the lower frequency hearing capabilities that humans exhibit. Within the range of approximately 4 kHz to just under 20 kHz that they overlap with humans, the bats have more sensitive hearing than humans. The Mariana fruit bat is expected to have an audiogram similar to the two bat audiograms in Figure 4-1.

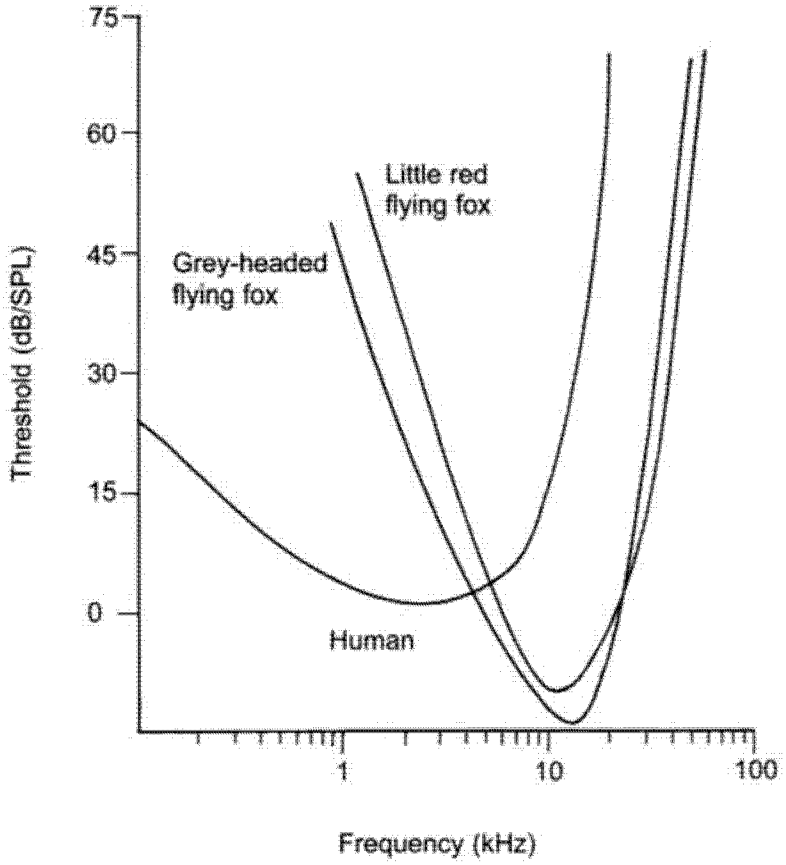


Figure 4-1. Audiogram of Little Red Flying Fox and Grey-Headed Flying Fox

The audiogram of little red flying fox *(Pteropus scapulatus)* and the grey-headed flying fox (*Pteropus poliocephalus*) compared to human hearing. The y-axis is a standard measure of hearing sensitivity. The higher the value the less sensitive the receiver is to that frequency (a louder volume is necessary to hear that particular frequency). Figure is taken from Hall and Richards (2000).

Construction projects will be temporary and localized within existing noise contours that range from 60 to 85 dB day-night average sound level.[1] No direct impacts to the Mariana fruit bat are anticipated as a result of construction noise related impacts associated with the Proposed Action because no increase of noise in the environment is anticipated.

[1] The day-night average sound level (DNL) is the A-weighted equivalent sound level for a 24 hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10 p.m. to 7 am. The noise between the hours of 10 p.m. and 7 a.m. is artificially increased by 10 dB. This noise is weighted to take into account the decrease in community background noise of 10dB during this period.

Construction Lighting

Bats are nocturnal animals and are adapted to low-light conditions. This means that some bat species can find artificial lighting disturbing. It is not known if the Mariana fruit bat is disturbed by light.

No proposed or existing facilities are known to be used by roosting bats or are adjacent to areas used by roosting bats. However, if it is considered necessary to illuminate facilities known to be used by roosting bats or adjacent to roosting bats, hooded lights will be used.

No direct impacts to the Mariana fruit bat are anticipated as a result of construction lightings because none of the construction projects which have the potential to affect Mariana fruit bat roosts will use night-time lighting.

Operations

The effect on the Mariana fruit bat of ongoing and increased noise resulting from increased jet aircraft and helicopter use of the main runways at AAFB was analyzed in the ISR Strike BO (USFWS 2006). In that consultation, the USFWS expected that noise effects would adversely affect the Mariana fruit bat to the extent that the nearby Pati Point colony would be abandoned by the 21 bats estimated to remain there in 2006. USFWS determined that fruit bats relocating from Pati Point to other, less-protected areas on the island likely would be shot opportunistically by hunters (USFWS 2006). In the ISR Strike BO, the USFWS concluded that the remaining fruit bats on Guam would be taken as a result of the Proposed Action, but that this incidental take would not jeopardize the continued overall existence of the Mariana fruit bat (USFWS 2006).

In the 2010 JPGO BO, the USFWS concluded that the adverse impacts of noise caused by the Proposed Action on the Mariana fruit bat at Pati Point on AAFB are expected to be substantial. "We believe the current roost site in the Natural Area at Pati Point on AAFB will likely be abandoned by the few bats remaining there as a result of the Proposed Action." The BO stated "The proposed JGPO project will increase jet traffic by approximately 25% and will approximately double the number of helicopter operations. …Any remaining bats at the Pati Point-area colony are likely to abandon that site as a result of project-related noise. This is because: (a) the increase in aircraft operations will further reduce the quality of the current site for normal roosting by further increasing bat activity levels throughout the day; (b) alternate sites of sufficient quality are available to the west and northwest of Pati Point and on the Island of Rota; and (c) the current colony site, and other roost sites, have been abandoned in the past because of human disturbance and other factors. Because noise from the ISR Strike BO and this BO [2010] will occur contemporaneously, it would not be possible to attribute the take to a single project."

As stated in Section 3.2, surveys of the Pati Point colony have indicated very low (less than 5 bats in 2011) attendance, indicating this colony site is no longer being used. There have been adverse effects to the Pati Point colony, however the decline of the colony is not due to noise from ISR Strike or JGPO aircraft (noise) operations as both programs have been delayed in implementation.

In addition to aviation training, ground-based training occurs for force protection using pyrotechnics, ground burst simulators, smoke grenades, and 40-pound cratering charges. Noise levels from these operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Critical Habitat

The proposed area for the new GNWR administration buildings, visitor's center, associated roads and parking lot contains 12 acres (5 ha) of primary limestone forest supporting both PCEs for fruit bat critical habitat. Noise and disturbance-related construction impacts would be temporary in nature. The proposed 12-acre (5-ha) construction area is already subject to daily human disturbance due to aircraft operations and other DoD activities at AAFB, and its proximity to the access road to the GNWR, adjacent beaches, and private property to the southwest.

The area within the southwestern portion of the critical habitat area, adjacent to the GNWR boundary, would be used for the relocation of the existing GNWR administration buildings and visitor center that are currently located to the northeast, near Ritidian Point. Two additional areas near Ritidian Point in the center of the critical habitat area are developed areas containing the existing GNWR administrative buildings, roads, and parking lots. In accordance with the final rule designating critical habitat (USFWS 2004a), developed areas were not designated critical habitat; therefore, proposed demolition activities within these two areas would not affect critical habitat.

Although new construction of the replacement GNWR facilities would directly impact 12 acres (5 ha) of designated critical habitat, the remaining critical habitat would remain functional (or retain the current ability for the PCEs to be functionally established) to serve the intended conservation role for the fruit bat. Accordingly, given the above, construction impacts would not appreciably diminish the value of the critical habitat for both the survival and recovery of the Mariana fruit bat.

Additional potential impacts to Mariana fruit bat critical habitat could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF that would be adjacent to critical habitat. DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The intent was to gather data to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge System and inconsistent with the wildlife conversation purposes of GNWR. The DON developed an alternate plan to study ambient noise at NWF-AAFB. Ambient noise was recorded at three NWF-AAFB locations between April 15-22, 2014. One site was at the edge of the cliff overlooking the GNWR approximately in line with the with the MPMG range, a second cliff edge location was at Ritidian Point and the third location was approximately 200 meters back from Ritidian Point along the cliff edge facing west-north west in the direction of the GNWR, the access road and northwester most portions of private property at Urunao. Professional-grade Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

In the October 28, 2004 Federal Register designating critical habitat for the Mariana fruit bat, Guam Micronesian kingfisher and the Mariana crow on Guam, the comments questioned why the USFWS had not addressed the adverse impacts of jet noise on fruit bats and birds. The USFWS concluded that the presence of auditory or visual human disturbances does not affect the presence of the primary constituent elements used to define critical habitat.

Implementation of BMPs (e.g., installation of hooded lights in the vicinity of fruit bat critical habitat) will be used to the maximum extent possible to avoid and minimize the illumination of forest and critical habitat.

In conclusion, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

In the 2010 BO, the USFWS acknowledged that "we have insufficient data to estimate with confidence how much forest is necessary to support fruit bat recovery." However, the USFWS has identified approximately 29,308 ac (11,860 ha) of habitat on Guam as suitable for the recovery of the Mariana fruit bat (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

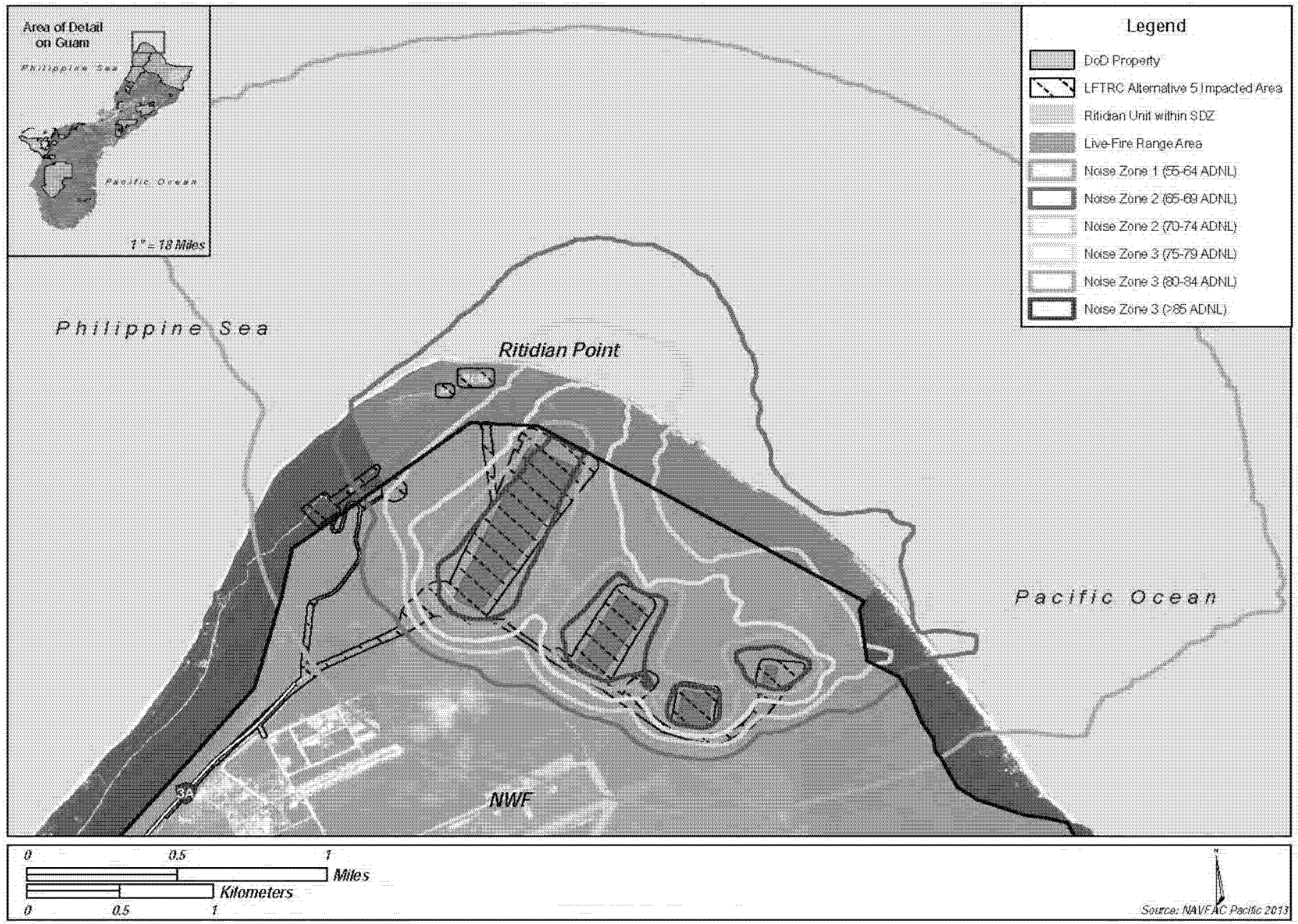
The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Mariana fruit bat would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). In the 2010 BO, the USFWS concluded that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the Mariana fruit bat in the wild because sufficient habitat and populations are likely to persist throughout its range at levels that retain the potential for recovery of this species. The current Proposed Action is anticipated to impact approximately 1,065 acres of Mariana fruit bat recovery habitat (Figure 3-1). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the *Serianthes* bracing and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana fruit bat. These actions serve to minimize or compensate for project effects on the Mariana fruit bat (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Mariana fruit bat would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). In the 2010 BO, the USFWS concluded that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the Mariana fruit bat in the wild because sufficient habitat and populations are likely to persist throughout its range at levels that retain the potential for recovery of this species. The current Proposed Action is anticipated to impact approximately 1,065 acres of Mariana fruit bat recovery habitat (Figure 3-1). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

Figure 4-2. Small Arms A-Weighted day-night average sound level, Noise Zones for NWF



BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the *Serianthes* bracing and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana fruit bat. These actions serve to minimize or compensate for project effects on the Mariana fruit bat.

Conclusion

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) few to no bats within the Proposed Action Area, (3) the slower pace of construction than the 2010 Proposed Action, (4) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (5) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Mariana fruit bat, its critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures mentioned above is improved habitat quality for the Mariana fruit bat. Although recovery habitat has been identified by the USFWS, the habitat is not currently suitable to support the recovery of the species as predation from the BTS is believed to one of the reasons for the lack of fruit bat recovery on Guam (USFWS 2009), BTS research and suppression should benefit the species and other native species on Guam. Forest enhancement would support the recovery of the species as habitat destruction by man-made disturbances is one of the primary threats to the species throughout its range.

Based on the potential direct and indirect effects on the Mariana fruit bat due to the proposed construction and operation of USMC facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Mariana fruit bat. This determination is consistent with the previous BO however, the rationale has changed. The previous conclusion was based on the USFWS anticipating that up to ten remaining Mariana fruit bats at the Pati Point natural area colony will be taken in the form of harassment due to loud aircraft noise resulting from the Proposed Action. The bat population on Guam continues to decline but the decline is not attributable to either the ISR Strike program or JGPO as both programs have been delayed in implementation. However, it is still possible for the Proposed Action to result in incidental take in the form of harassment for the small number of bats that remain on-island.

Table 4-1.Comparison of Recovery Habitat Impacts Between 2010 and 2014 Proposed Action

	Guam Micronesian Kingfisher		Guam Rail		Mariana Crow		Mariana fruit bat		Serianthes nelsonii	
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares
Current Recovery Habitat Remaining[1]										
Northern Guam	15,822	6,403	49,564	20,058	14,831	6,002	15,577	6,304	11,668	4,722
Southern Guam	13,488	5,458			11,819	4,783	13,731	5,557		
Total Necessary for Species Recovery[1]										
Northern Guam	13,134	5,315	41,184	16,668	7,463	3,020	Not Determined2		Not Determined	
Southern Guam	13,134	5,315			7,463	3,020				
Amount of Remaining Recovery Habitat Above Minimum Threshold Level Necessary for Species Recovery[1]										
Northern Guam	2,688	1,088	8,380	3,390	7,368	2,982	Not Determined[2]		Not Determined	
Southern Guam	354	143			4,356	1,763				
Recovery Habitat Within 2010 Project Description										
Northern Guam	1,520	615	1317	533	1,518	614	1,520	615	No Impacts	
Southern Guam	4	3			4	2	4	2		
Recovery Habitat Within 2014 Project Description										
Northern Guam	1,061	429	1071	433	1,068	432	1,061	429	933	378
Southern Guam	4	3			4	2	4	2	0	0
Decrease in Recovery Habitat Impacts between 2010 and 2014 Project Descriptions										
Northern Guam	459	186	246	100	450	182	459	186	Not Applicable	
Southern Guam	0	0			0	0	0	0		
Recovery Habitat Remaining after 2014 Project Description is Completed										
Northern Guam	14,761	5,974	48,493	19,625	13,763	5,570	Not Determined[2]		Not Determined	
Southern Guam	13,484	5,455	0	0	11,815	4,781				
Amount of Recovery Habitat Above Minimum Threshold for Species Recovery after 2014 Project Description is Completed										
Northern Guam	1,627	659	7,309	2,957	6,300	2,550	Not Determined[2]		Not Determined	
Southern Guam	350	140	7,309	2,957	4,352	1,761				

[1] Based on 2010 BO

[2] USFWS has insufficient data to estimate with confidence how much forest is necessary to support fruit bat recovery

4.3 POTENTIAL EFFECTS TO THE MARIANA CROW

Construction and Operations

The Mariana crow is considered extirpated from the wild on Guam (USFWS 2013b). The closest population of crows is on the island of Rota, approximately 56 miles (90 km) north of Guam. There are currently neither projected dates for reintroduction of the crow, nor successful suppression of the BTS to a level which would support reintroduction. Until the crow is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the crow would be limited only to recovery prospects (addressed below).

Critical Habitat

The analysis of the potential effects to critical habitat for the Mariana crow are the same as stated in Section 4.2 for the Mariana fruit bat. As stated above, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the

application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

The USFWS has identified approximately 26,650 ac (10,785 ha) of habitat on Guam as suitable for the recovery of the Mariana crow (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated a minimum of 14,926 acres (6,040 ha) were needed to recover the species on Guam and 1,522 acres of habitat suitable for the recovery of the Mariana crow would be lost due to the Proposed Action (1,518 acres in the north and 4 acres in the south). The 2010 BO stated the Proposed Action was not likely to appreciably reduce the likelihood of the survival and recovery of the Mariana crow in the wild. The current Proposed Action is anticipated to impact approximately 1,072 acres of Mariana crow recovery habitat (Figure 3-2). This is a decrease of 450 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana crow. These actions serve to minimize or compensate for project effects on the Mariana crow.

Conclusion

The Mariana crow is currently extirpated from the wild on Guam, therefore no take will occur as a result of the Proposed Action. Based on the potential indirect effects to the Mariana crow from habitat loss due to the proposed construction of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Mariana crow. This determination is consistent with the previous BO. Although the Proposed Action will result in a permanent loss of available habitat for the Mariana crow on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species. This determination is consistent with the previous BO.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, (3) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (4) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Mariana crow critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures mentioned above is improved habitat quality for the Mariana crow and the availability of resources critical for the survival and reproduction of the species. As predation from the BTS is believed to be the overriding factor in the decline of the Mariana crow on Guam (USFWS 2005b), BTS research and suppression should benefit the species and other native species on Guam. In addition, predation by cats is considered a primary threat to the crow throughout its range (USFWS 1984, USFWS 2005b) so cat control should also benefit this species. Forest enhancement would support the recovery of the species as habitat degradation due to grazing by feral

ungulates and range expansion of invasive plants are also factors in the decline of the Mariana crow (USFWS 2005b).

Although the Proposed Action will cause an immediate loss of recovery habitat, the crow is extirpated from the wild on Guam and the existing off island populations are not expected to encounter an impact from the Proposed Action as the BTS is still the primary factor limiting survival of the species on Guam. The opportunity for reintroduction of this extirpated species on Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Currently there are neither a plan or projected dates for reintroduction of the Mariana crow on Guam. Reintroduction is not anticipated in the foreseeable future, but USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.4 POTENTIAL EFFECTS TO THE GUAM MICRONESIAN KINGFISHER

Construction and Operations

The Guam Micronesian kingfisher was extirpated from the wild by 1988 (Wiles et al. 2003). The species exists primarily in captivity on Guam and in mainland zoos. There are currently neither projected dates for reintroduction of the kingfisher, nor successful suppression of the BTS to a level which would support reintroduction. Until the kingfisher is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the kingfisher would be limited only to recovery prospects (addressed below).

Critical Habitat

The analysis of the potential effects to critical habitat for the Guam Micronesian kingfisher are the same as stated in Section 4.2 for the Mariana fruit bat. As stated above, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

The USFWS has identified approximately 29,310 ac (11,561 ha) of habitat on Guam suitable for the Guam Micronesian kingfisher (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated a minimum of 26,268 acres (10,630 ha) were needed to recover the species on Guam. The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Guam Micronesian kingfisher would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). The current Proposed Action is anticipated to impact approximately 1,065 acres of Guam Micronesian kingfisher recovery habitat (Figure 3-3). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species. In 2010, the USFWS concluded that the effects of the subject action, taken together with cumulative effects, were not likely to appreciably reduce the likelihood of both the survival and recovery of the Guam Micronesian kingfisher in the wild (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Guam Micronesian kingfisher. These actions serve to minimize or compensate for project effects on the Guam Micronesian kingfisher.

Conclusions

The Guam Micronesian kingfisher is currently extirpated from the wild, therefore no take will occur as a result of the Proposed Action. Based on the potential indirect effects on the Guam Micronesian kingfisher due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Guam Micronesian kingfisher. Although the Proposed Action will result in a permanent loss of available habitat for the Guam Micronesian kingfisher on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species. This determination is consistent with the previous BO.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, (3) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (4) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Guam Micronesian kingfisher critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures is improved habitat quality for the Guam Micronesian kingfisher. Currently, a high density of BTS is the primary factor preventing the kingfisher's survival and recovery on Guam. BTS research and suppression should benefit the species and other native species on Guam. Forest enhancement will also support the recovery of the species as habitat degradation from feral ungulate browsing and trampling is also a factor in the decline of the kingfisher (USFWS 2008a).

Although the Proposed Action will cause an immediate loss of recovery habitat, the kingfisher is extirpated from the wild on Guam and the existing captive populations would not immediately encounter an impact from the Proposed Action. The opportunity for reintroduction of this extirpated species on Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Although recovery habitat has been identified by the USFWS, the habitat is not currently suitable to support the recovery of the species as predation from the BTS is believed to one of the reasons for the lack of fruit bat recovery on Guam Currently there are neither a plan or projected dates for reintroduction of the Guam Micronesian kingfisher on Guam. Reintroduction is not anticipated in the

foreseeable future, but USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.5 POTENTIAL EFFECTS TO THE GUAM RAIL

Construction and Operations

The Guam rail was believed to have been extirpated from the wild on Guam by 1987 (Wiles et al. 1995) and exists primarily in captivity on Guam and in mainland zoos. There are currently neither projected dates for reintroduction of the rail on the main island of Guam, nor successful suppression of the BTS to a level which would support reintroduction. Until the rail is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the rail would be limited to recovery prospects (addressed below).

Critical Habitat

There is no critical habitat designated for the Guam rail.

Recovery Habitat

The USFWS has identified approximately 49,564 ac (20,058 ha) of habitat on Guam as suitable for the Guam rail (USFWS 2010a). The 2010 BO estimated a minimum of 41,184 acres (16,668 ha) were needed to recover the species on Guam. In the 1990 recovery plan for the rail, the USFWS identified the interim recovery objectives for downlisting the Guam rail from endangered to threatened as 1,000 birds in northern Guam and 1,000 birds in southern Guam (total = 2,000 individuals; USFWS 1990b). There were no criteria for delisting the species. The 2010 BO referenced an article by Trail et al. (2009) entitled "Pragmatic population viability targets in a rapidly changing world" that suggested that a minimum viable population target of 5,000 individuals is an appropriate target for species conservation. The article was not specific to rails or birds or any species but rather an overall approach to population targets. The recovery habitat criteria for the rail was based on an internal memorandum for February 2010 (Amidon 2010 in USFWS 2010a) and used the 5,000 individuals in the estimation of recovery habitat needed to delist the Guam rail. To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated 1,317 acres of habitat suitable for the recovery of the Guam rail would be lost due to the Proposed Action. The current Proposed Action is anticipated to impact approximately 1,071 acres of Guam rail recovery habitat (Figure 3-4). This is a decrease of 246 acres and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Guam rail. These actions serve to minimize or compensate for project effects on the Guam rail.

Conclusion

Because the Guam rail is extirpated from the wild on Guam, no adverse effects to individual rails will occur as a result of the Project Description. Based on the potential indirect effects on the Guam rail due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Guam rail. Although the Proposed Action will result in a permanent loss of available habitat for Guam rails on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, and (3) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Guam rail and its recovery habitat.

The anticipated benefit of implementing the conservation measures is improved habitat quality for the Guam rail. The primary reason for the decline in the Guam rail is believed to be from predation by cats and BTS. BTS research and suppression as well as cat control should benefit the species and other native species on Guam.

The anticipated benefit of implementing this conservation measure is improved habitat quality for the Guam rail and the availability of resources critical for the survival and reproduction of this species and other species that the habitat is able to support. Although the Proposed Action will cause an immediate loss of recovery habitat, the rail is currently extirpated from the wild on Guam and the existing captive or off island populations would not immediately encounter an impact from the Proposed Action. The opportunity for reintroduction of these extirpated species on island of Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Currently there is neither a plan nor projected dates for reintroduction of the Guam rail. USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.6 POTENTIAL EFFECTS TO THE MARIANA GRAY SWIFTLET

Construction and Operations

The potential effects to the Mariana gray swiftlet remain unchanged from the 2010 BO. The following are excerpts from the analysis from the 2010 BO.

The current estimate of the Mariana swiftlet population on Guam is 1,150 birds (Grimm 2008). On Guam, all three of the caves currently occupied by Mariana swiftlets are located within the NMS, and none of the proposed project stressors will occur near those caves.

However, new aviation training flight paths are proposed over the Talafofo River watershed, the primary foraging area for swiftlets on Guam, and over the NMS area (Figure 3-5). Flights may also occur over the Ugum River watershed that supports swiftlet foraging near the mouth of the river. Foraging by most members of the swift family is likely limited to 328 ft (100 m) above the tree canopy because of the reduction in insect prey above that level (Chantler 1999). Tree canopy height plus 328 ft (100 m) is expected to be well below 1,000 ft (305 m) above ground level, thereby reducing risk of bird/wildlife aircraft strike hazard but noise generated by the aircraft may still affect swiftlet foraging behavior, as has been documented in other species.

Critical Habitat

There is no critical habitat designated for the Mariana gray swiftlet.

Recovery Habitat

There is no recovery habitat identified for the Mariana gray swiftlet.

BMPs and Conservation Measures

To avoid bird strike and noise impacts to Mariana gray swiftlet, all aviation training will be conducted so that flights will approach the southern portion of the NMS over the Talafofo River watershed and Fena Reservoir at heights of 1,000 ft (305 m) or greater above ground level. Flights may go up the Ugum River at altitudes of 1,000 ft (305 m) or greater above ground level until they reach 9,843 ft (3,000 m) from the mouth of the river at Highway 4 and then flights may conduct low level terrain flights. Low-level training flights will be restricted to the southernmost portion of the NMS where swiftlets and moorhen are not commonly present.

Consistent with the MIRC BO, the DoD will maintain 328-ft (100-m) no training buffers around the known Mariana swiftlet nesting caves (e.g., Mahlac Cave, Fachi Cave, Maemong Cave) in the NMS and will continue to trap brown treesnake within areas surrounding the swiftlet caves.

Conclusion

Because the proposed project will avoid Mariana swiftlet cave habitat, and because the proposed approach of aircraft will be higher than foraging Mariana swiftlets, the Proposed Action **is not likely to adversely affect** the Mariana swiftlet.

4.6 POTENTIAL EFFECTS TO *SERIANTHES NELSONII*

Construction and Operations

The only known mature *Serianthes* tree on Guam is located on the northwest corner of the impacted area associated with the proposed MPMG Range. The tree at NWF is in poor condition due to termites and

rotting at the base. The tree is leaning which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon.

Current literature regarding the protection of trees from construction activities, recommend a protective buffer based on the diameter at breast height (dbh) of the subject tree (Oregon State University 2009; University of Hawaii 2010; Johnson 2013). This buffer is related to the "critical root radius" approach which is calculated by measuring the dbh in in. For each inch of dbh, there is to be 1.5 ft (0.5 m) of critical root radius for sensitive, older, or unhealthy trees, or 1 ft (0.3 m) for tolerant, younger, healthy trees to ensure protection of the root zone. Therefore, based on the current dbh of 22.4 in (57 cm) for the subject *Serianthes* at NWF, the buffer would be 33.6 ft. To avoid any impacts to this tree, a minimum buffer of 100 ft (30 m) would be established around the tree and no activities would be permitted within this buffer. Therefore, there would be no impacts to the *Serianthes* tree with implementation of the proposed construction activities associated with the Proposed Action.

Critical Habitat

There is no critical habitat designated for *Serianthes nelsonii.*

Recovery Habitat

The 2010 BO did not address effects *Serianthes nelsonii* as the DON determined "no effect" to the species as part of the 2010 Proposed Action. However, as part of the consultation, the USFWS provided the DON with digital files depicting recovery habitat for *Serianthes nelsonii.* The digital files indicate there are approximately 11,668 ac (4,722 ha) of habitat on Guam suitable for *Serianthes nelsonii*. To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The current Proposed Action is anticipated to impact approximately 933 acres of *Serianthes nelsonii* recovery habitat (Figure 3-6) (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of *Serianthes nelsonii* on Guam. These actions serve to minimize or compensate for project effects on the *Serianthes nelsonii* on Guam.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, and (3) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the *Serianthes nelsonii* recovery habitat.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

Conclusion

Based on the potential direct and indirect effects on *Serianthes nelsonii* due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **may affect but is not likely to adversely affect** *Serianthes nelsonii*. Although the Proposed Action will result in a permanent loss of available habitat for *Serianthes nelsonii* on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species.

4.7 POTENTIAL EFFECTS TO SEA TURTLES

Construction and Operations

The proposed project construction, operation, and maintenance of facilities on Guam will have no direct impact on sea turtle basking and nesting habitat. However, recreational beach use is expected to increase on Guam due to the increase in military and civilian populations.

The green and hawksbill sea turtles potentially nest along the Haputo ERA beach and Tarague Beach. Two suspected nest attempts by green sea turtles have been observed at Haputo Beach between 2008 and 2010, with no observations of nest attempts during 51 surveys from 2010 to 2012 (Grimm and Farley 2008; NAVFAC Marianas 2011; Brindock 2012). All main cantonment components would be constructed on the upper plateau area of Finegayan and would not occur in the Haputo ERA. Construction personnel are issued base passes for official business only within proposed construction areas; these restrictions are specified in construction contracts. Use of Haputo and Tarague Beach is not expected to increase as a result of construction activities; therefore, there would be no impacts from construction personnel to sea turtles that may occur on the Haputo or Tarague Beach.

Green sea turtle nesting is documented on the GNWR north of the proposed LFTRC impacted areas. The hawksbill sea turtle has not been definitively determined to nest on Guam (JRM 2013). There are no sea turtle nesting beaches within proposed impacted areas associated with LFTRC. No explosive projectiles are proposed for use and all projectiles are expected to be contained within the range footprint by bullet traps or backstops, with the exception of ricochets. The DoD standard for risk acceptance on ranges is a 99.9999% level of containment, which means the probability of munitions (for inert ordnance) or a hazardous fragment (for live ordnance) escaping the SDZ is one in a million. Signage as well as lighting (blinking red lights) would notify people in the area that the ranges are in use. However, the design of the signage and lighting would be designed to insure minimal to negligible impacts on sea turtles.

Noise levels from ground training operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Potential impacts could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF. In order to address this question, DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The data gathered was intended to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge

System and inconsistent with the wildlife conversation purposes of GNWR. DON proceeded with the noise study on AAFB and between April 15-22, 2104, DON recorded ambient noise on NWF at AAFB at three recording locations. Two sites were at the edge of the cliff overlooking GNWR. One site was 200 m back from the cliff edge. Professional-grade Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

The majority of scientific information about sea turtle hearing has assessed their hearing in the water. Hearing underwater is the most important environment for turtles to be assessed in because the vast majority of sea turtles' time is spent in the water, with the females spending only a few hours on land each year for nesting. Green sea turtles are an exception, because they spend some time basking on beaches (Whittow and Balazs 1982). The general properties of turtle hearing are expected to be similar in the water and on land, but turtles are expected to be less sensitive to sound on land than in the water, because turtles have evolved to hear primarily in the water.

The opening into a sea turtle's ear is covered by thick skin, known as the cutaneous plate, which is a ring of scales that are similar but smaller than those on the rest of the head. Below this skin is a fatty (subcutaneous) layer. The thick skin and a fatty layer make it difficult for the turtle to hear well in air, but provide good tissue conduction for underwater sound to the middle ear and inner ear. Sea turtles do not have external ears or ear canals to channel sound to the middle ear, nor do they have a specialized eardrum. Instead, fibrous and fatty tissue layers on the side of the head may serve as the sound receiving membrane in the sea turtle (Ketten 2008), a function similar to that of the eardrum in mammals, or may serve to release energy received via bone conduction (Lenhardt, Bellmund et al. 1983). Unlike mammals, the cochlea of the sea turtle is not elongated and coiled and likely does not respond well to high frequencies, a hypothesis supported by information on sea turtle auditory sensitivity (Ridgway, Wever et al. 1969, Bartol, Musick et al. 1999, Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012, Martin, Alessi et al. 2012).

The auditory system of the sea turtle appears to work via water and bone conduction, with lower frequency sound conducted through to skull and shell, or via direct stimulation of the structures of the middle ear (Christensen-Dalsgaard, Brandt et al. 2012). The water and bone conduction does not appear to function well for hearing in air (Lenhardt, Bellmund et al. 1983). Recent research has shown that sea turtles are capable of hearing in air, and although it is difficult to compare aerial and underwater thresholds directly, frequencies of sensitivity are similar for several species tested (Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012). Because of the similarity of physiology, ecology, and empirical data on hearing, the frequency range of sea turtle species are presumed to be similar.

Investigations suggest that sea turtle auditory sensitivity is limited to frequencies below 1,000 Hertz [Hz]), such as the sounds of waves breaking on a beach. Sea turtles typically hear frequencies from 30 to 2,000 Hz, with a range of maximum sensitivity between 100 and 800 Hz (Ridgway, Wever et al. 1969, Lenhardt 1994, Bartol, Musick et al. 1999, Lenhardt 2002, Bartol and Ketten 2006). Hearing below 80 Hz is less sensitive but still potentially usable (Lenhardt 1994). The role of underwater low-frequency hearing in sea turtles is unclear. It has been suggested that sea turtles may use acoustic signals from their environment as navigational cues during migration and to identify their natal beaches (Lenhardt, Bellmund et al. 1983) or to locate prey or avoid predators. Recent work using auditory evoked potentials

have shown that hawksbill sea turtles are able to detect sounds in both air and water. However, ranges of maximum sensitivity and thresholds differed between the two media, though in general, sensitivities were higher at frequencies below 1,000 Hz (Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012).

Juvenile and sub-adult green sea turtles detect sounds from 100 to 500 Hz underwater, with maximum sensitivity at 200 and 400 Hz (Bartol and Ketten 2006). Auditory brainstem response recordings on green sea turtles of 2, 5, and 9 years of age all showed an average peak response at 300 Hz (Yudhana, Din et al. 2010). In another study, sub-adult green turtles also show, on average, the lowest hearing threshold at 300 Hz (93 decibels [dB] referenced to [re] 1 micropascal [µPa]), with thresholds increasing at frequencies above and below 300 Hz, when thresholds were determined by auditory brainstem response (Bartol and Ketten 2006). Adult green turtles have greatest sensitivity to frequencies between 300 and 400 Hz (Ridgway, Wever et al. 1969).

For green turtles that come ashore in northern Guam, the greatest amount of ambient noise energy occurs in frequencies to which the green turtle is most sensitive. Unweighted ambient noise recorded from the edge of the cliff above the Guam National Wildlife Refuge showed the greatest persistent sound levels occurred below 500 Hz (NAVFAC Pacific 2014). Sound levels that were integrated across five-minute intervals measured sound pressure levels (SPLs) that often exceeded moderate noise levels such as 60 to 65 dB. Peak sound levels could exceed 75 dB in the octave band centered at 125 Hz on a regular basis. Much of this low frequency noise is attributed to waves. Sound levels at the top of the cliff several hundred feet above and back from the shoreline would be expected to be lower than sound of waves at the beach. Turtles on the beach would be certain to receive low frequency SPLs significantly greater than that recorded at the top of the cliff and the noise would be in the most sensitive part of their hearing range. In that environment, most other sounds in those frequency ranges could be expected to be masked by the proximate noise from the surf, which would make perceiving sounds in the same frequency range challenging (Lohr, Wright et al. 2003, Amézquita, Hödl et al. 2006).

In addition to aviation training, ground-based training occurs for force protection using pyrotechnics, ground burst simulators, smoke grenades, and 40-pound cratering charges. Noise levels from these operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Additional potential impacts to Mariana fruit bat critical habitat could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF that would be adjacent to critical habitat. DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The data gathered was intended to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge System and inconsistent with the wildlife conversation purposes of GNWR. DON proceeded with the noise study on AAFB and between April 15-22, 2104, DON recorded ambient noise on NWF at AAFB at three recording locations. Two sites were at the edge of the cliff overlooking GNWR. One site was 200 m back from the cliff edge. Professional-grade

Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

Critical Habitat

There is no terrestrial critical habitat designated for the green or hawksbill sea turtle.

Recovery Habitat

The 2010 BO did not include recovery habitat for the green or hawksbill sea turtle and we are not aware of any subsequent recovery habitat criteria being developed.

BMPs and Conservation Measures

The Chief of Naval Operations issued a policy letter in 2002 regarding preventing feral cat and dog populations on Navy property. Enforcement of the policy and associated BMP regarding free-roaming pets would prevent potential impacts to nesting sea turtles from harassment, injury or mortality from pets.

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing and Mariana fruit bat recovery actions on Rota) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of the sea turtles on Guam. In addition, night operations at the LFTRC will depend on the number of personnel required to complete annual individual training events, the duration of each event, and the training capacity of each range. Proposed night time live-fire operations at the LFTRC are not continuous and would occur between 7:00 p.m. and 10:00 or 6:00 a.m. and 7:00 a.m up to 39 weeks per year. These actions will minimize or compensate for project effects on the green and hawksbill sea turtles on Guam.

Conclusion

Based on the potential direct and indirect effects on the sea turtles due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **may affect but is not likely to adversely affect** the two species of sea turtles.

Potential impacts to sea turtles were evaluated for a similar, but larger Proposed Action in the 2010 Final EIS (Volume 2, Chapter 10: Terrestrial Biological Resources, Section 10.2.2.1: North, NCTS and South Finegayan; page 10-118), and 2010 BO. The effects determination in the 2010 BO was "may affect but not likely to adversely affect the species." The current effects determination is the same as the reduced size of the Proposed Action would continue to not likely adversely affect the species.

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CHAPTER 5
CUMULATIVE EFFECTS ANALYSIS

"Cumulative effects" under the ESA are those effects of *future* State or private activities, *not* involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation [50 CFR 402.02].

The future state or private activities that are reasonably certain to occur in the Action Area include the following:

- Commercial and recreational fishing
- Tourism
- Commercial shipping
- Private development
- Natural resources management
- Regional Biosecurity Plan

Implementing the Proposed Action in conjunction with other past, current, and future activities could affect terrestrial biological resources within the Action Area. Several ongoing or successional activities can contribute cumulatively to habitat degradation, including disturbance to soils and vegetation, control of non-native invasive species and/or spread of invasive non-native species, an increase in erosion and sedimentation, and impacts on native plant and animal species. Additionally, the development of Guam over the next few years on non-DoD lands may increase pressure on terrestrial habitats within DoD lands and development on DoD lands may increase pressure on terrestrial habitats on non-DoD lands. Although individual effects may be less than significant, collectively they have the potential to be cumulatively significant over time.

Fifteen reasonably foreseeable projects have the potential to contribute to an adverse cumulative effect to terrestrial biological resources on Guam (Table 5-1). This would be primarily due to the potential loss of native habitat and the increased potential for the spread of invasive species. Examples of projects with potential adverse impacts include Sigua Highlands (C-47), Route 4 Curve Widening (S-28), and 60 MW power Plant (G-6).

All new development requiring vegetation clearing has potential to impact terrestrial biological resources. There are federally and locally established habitat conservation areas, and increases in human population or other noise generating activities near these areas can disturb the populations of species that are to be protected in the conservation areas. There would be cumulative effects associated with the collective action alternatives in conjunction with recently completed, present, and reasonably foreseeable actions. The additive impact would be strong because the impacts could be long-term and difficult to reverse. Many of these projects, developments, and actions, and their impacts on terrestrial biological resources cannot be determined with specificity at this time. Most of the projects require ground disturbance, and the assumption is that terrestrial biological resources would be affected. The terrestrial biological resource health on Guam would continue to decline, and threatened and endangered species would continue to be vulnerable to natural and anthropogenic stressors. Because the development area of the collective action alternatives is presumably larger than that of the recently completed, present, and reasonably foreseeable actions, the additive cumulative impacts are primarily due to the direct impacts of the collective action alternatives.

GovGuam reviews private and commercial development proposals for potential impacts to terrestrial biological resources. USFWS and GovGuam review DoD and other federal development proposals and

mitigation is developed through the consultation process There are local and federal initiatives and protocols to prevent the introduction of non-native species. There are local and federal conservation and restoration efforts. No additional mitigation is proposed for cumulative impacts to terrestrial biological resources.

A complete discussion of the cumulative impacts of other federal projects within the Action Area can be found in Chapter 7 of the Final SEIS.

Table 5-1. Summary of Potential Long-Term Impacts of Present and Reasonably Foreseeable Future Projects on Resource Area

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																		
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
Guam - General Actions (G) (not mapped)																						
G-6	GovGuam	60 MW Power Plant	RF		X	X			X		X		X	X			B	B	X	B	B
G-7	Rubio & David	Health Clinic	P		X						X		X	X	X			B		B	B
G-8	Carlos & Rosemarie Takano	Multi-Family Dwelling	P		X					X	X		X	X				B			B
G-9	GovGuam	Pole Hardening	P																	B	B
G-10	GovGuam	Territorial Prison	RF		X				X		X		X	X				B		B	B
G-11	GovGuam	Lateral Conversion Of Power Lines To Underground Lines	P						B		X		X	B			B			B	B
G-12	GovGuam	Wastewater System Planning	P		B							B					B				B
G-13	GovGuam	Facilities Plan / Design for WWTP	P		B							B					B			B	B
G-15	GovGuam	Water Booster Pump Station	P		B						X		X				B			B	B
G-18	GovGuam	Water Wells	P		B						X		X				B			B	B
G-19	GovGuam	Wastewater Collection System Replacement/Rehabilitation Program	P		B						X	B	X				B			B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
G-20	GovGuam	LS Priority 1 Upgrades	P		B							B					B			B	B
G-21	GovGuam	WWTP Priority 1 Upgrades	P		B							B					B			B	B
G-22	GovGuam	Water Distribution Pipe Replacement	P		B							B					B			B	B
N-29	Sung Kim	Small Commercial Development	P		X						X		X	X	X			B			
N-32	GovGuam	Northern District Wastewater Treatment Plant Phases 1-3	P		B						X	B	X				B			B	B
N-35	Golden Gate Services LLC	Single Family Homes	P		X					X	X		X	X	X			B			B
N-36	TRI Inc.	Paradise Meadows	P	X	X					X	X		X	X	X			B			B
N-37	GDPW	Jinapsan Road	P	X	X				B	B	X	X			B			B			
N-38	Guam Healthcare	Guam Regional Medical City	P	X	X				X		X		X	X	X			B		B	B
N-41	Vantage Group	Villa Pacita Estates	P	X	X					X	X		X	X	X			B			B
N-42	GovGuam	Relocation of Dededo Flea Market and Construction of Farmer's Co-op	P	X							X		X	X	X			B			
N-43	Hawaiian Rock Products	Infrastructure Construction	P								X		X		B					B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-21	Access Development Company	Emerald Ocean View Park	P	X	X					X	X	X	X	X	X	X	X	B			B
C-22	GovGuam	Guam Memorial Hospital Emergency Room Expansion	P								X		X					B		B	B
C-23	GovGuam	Ordot Dump Closure Construction and Dero Road Sewer Improvements	P		B				B								B	B		B	
C-24	GovGuam	Guam Museum	P						B	B	X		B	X				B			
C-25	Laguna at Pago Bay Resort	Upscale Residential Development	P	X	X					X	X		X	X	X			B			B
C-27	Orion Construction	Island Surgical Center	P		X				X		X		X	X	X			B		B	B
C-28	GHURA	Summer Green Residences	P	X	X					X	X		X	X	X			B			B
C-29	GovGuam	Route 1-8 Intersection Improvements & Agana Bridges Replacement	P	B	B						X		X		B					B	B
C-30	GovGuam	Rehabilitation of Asan Springs	P		B						X		X				B			B	B
C-31	GovGuam	Route 26/25 Intersection Improvements	RF	B	B						X		X		B					B	B

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-32	UoG	Wind Turbine	P			B		X	X		X		X	X			B			B	B
C-34	Access Development Company	Hemlani Apartments	P	X	X					X	X		X	X	X			B			B
C-35	GovGuam	Guam Airport Project	RF		X		X	X			X		X					B		X	B
C-36	GovGuam	Route 26 Reconstruction & Widening, Route 1 to Route 25	RF	B	B						X		X		B					B	B
C-37	GovGuam	Route 10A, Rehabilitation & Widening, Sunset Blvd. to Route 16	RF	B	B						X		X		B					B	B
C-38	GovGuam	Runway Rehabilitation and Expansion	P			X		X			X		X							B	B
C-39	GovGuam	Gregorio D. Perez Marina Renovation & Site Improvement Project	P							B		X	X	X		B					B
C-40	GovGuam	Gregorio D. Perez Marina Dock C Repairs	P							B		X	X			B					B

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				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-41	GovGuam	Facilities Plan for Hagåtña STP Improvements & Effluent Wastewater Pump Station	P		B							B					B			B	B
C-42	GovGuam	Hagåtña STP Improvements and Effluent Wastewater Pump Station	P		B						X	B	X				B			B	B
C-43	GovGuam	Agana STP Interim Measures	P		B						X	B	X				B			B	B
C-45	GUANG	Assembly Hall	P								X		X								B
C-46	GovGuam	Route 8/Canada Toto Loop Road Intersection Improvements	P	B	B						X		X		B					B	B
C-47	Guam Highlands Investment Group	Sigua Highlands / near Leopalace	RF	X	X					X	X		X	X	X		X	B			B
C-48	GovGuam	Tiyan Parkway, Phase 1	P	B	B						X		X		B					B	B
C-49	GovGuam	Route 14B (Ypao Road) Reconstruction & Widening, Route 1 to Route 14	P	B	B						X		X		B					B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-50	GovGuam	Route 10A, Route 1 GIA/Tiyan Intersection	RF	B	B						X		X		B					B	B
C-53	GovGuam	Repair Finegayan Road-Harmon Cutoff	RF	B	B						X		X		B					B	B
Guam - Central Apra Harbor (AH)																					
AH-1	CNM	Orote Magazines (P-425)	P		X						X		X						X	B	X
AH-2	GovGuam	Reforestation of Masso Reservoir	P	B	B	B					B	B	X	B							B
AH-8	GovGuam	Route 11 Improvements and Shore Protection	P	B	B						X	B	X		B					B	B
AH-9	GovGuam	Asan and Aguada Bridge Rehabilitation	RF		B										B					B	B
AH-10	CNM	X-Ray Wharf Improvements (P-518)	RF								X	X				B			X	X	
AH-11	GovGuam	Modernization Program: Port Reconfiguration, Maintenance and Repair	P			X					X	X	X		X	B		B	B	B	B
AH-12	GovGuam	Comprehensive Port-wide Closed Caption Television System	P								X		X				B				
AH-13	GovGuam	Marine & Port Security Operations Center	P		X						X	X	X			B				B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
AH-14	GovGuam	Emergency Backup Generators	P			X											B			B	B
Guam – South (S)																					
S-4	GovGuam	15 MW Solar / Wind Turbine	P			B		X	X		X		X	X			B			B	B
S-5	GovGuam	Santa Rita Springs Booster Pump	P		B							B					B			B	B
S-7	GovGuam	Brigade II (Ugum Lift) Booster Pump Station Upgrade	P		B							B					B			B	B
S-8	GovGuam	Ugum Water Treatment Plant Intake Modifications	P		B							B					B			B	B
S-9	GovGuam	Ugum Water Treatment Plant Reservoir Replacement	P		B						X	B	X				B			B	B
S-10	GovGuam	Old Agat Wastewater Collection (Phase II)	P		B							B					B			B	B
S-12	GovGuam	Old Agat Collection Continuation (Phase III)	P		B							B					B			B	B
S-14	GovGuam	Baza Gardens STP Replacement	P		B							B					B			B	B

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S-15	GovGuam	Agat / Santa Rita STP Replacement	P		B							B					B			B	B
S-16	GovGuam	Agat Marina Dock A Repair & Renovation	P		B					B		X				B			X		B
S-18	GovGuam	Umatac-Merizo STP Replacement	RF		B							B					B			B	B
S-19	GovGuam	Agfayan Bridge Replacement	P	B	B						X		X		B					B	B
S-20	GovGuam	Route 4, Togcha River to Ipan Beach Park	P	B	B						X		X		B					B	B
S-21	GovGuam	Route 17, Route 5 to Chalan Tun Ramon Baza, Phase 2A	P	B	B						X		X		B					B	B
S-22	GovGuam	Inarajan North Leg (As-Misa) Bridge Rehabilitation	P	B	B						X		X		B					B	B
S-23	GovGuam	Bile & Pigua Bridges Replacement	P	B	B						X		X		B					B	B

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
S-27	GovGuam	Route 17 Rehabilitation & Widening, Route 5 to Route 4A, Phase 2B	RF	B	B						X		X		B					B	B
S-28	GovGuam	Route 4 Curve Widening, Ylig Bridge to Dandan Road	RF	B	B						X		X		B					B	B
S-29	GovGuam	Route 5 Rehabilitation & Widening, Route 2A to Route 12	RF	B	B						X		X		B					B	B
S-31	GovGuam	Route 4, Ylig Bridge to Pago Bay	P	B	B						X		X		B					B	B
Number of recently completed projects potentially contributing to cumulative effects (X/B)			76	11/10	33/19	3/1	3/0	2/0	3/2	7/2	58/1	7/9	61/0	10/1	9/20	2/3	0/15	0/17	9/3	3/36	3/43
Number of present projects potentially contributing to cumulative effects (X/B)			95	9/16	56/40	5/3	4/0	8/0	4/4	11/5	67/1	7/23	67/1	17/2	15	5/6	0/29	0/19	5/6	5/52	3/63
Number of reasonably foreseeable projects potentially contributing to cumulative effects (X/B)			18	2/8	5/10	1/0	1/0	1/0	2/0	1/0	15/0	1/1	14/0	3/0	1/11	0/1	1/2	0/4	2/0	2/14	0/15
Total number of projects contributing to cumulative effects (X/B)			188	22/34	94/69	9/4	8/0	11/0	9/6	19/7	140/2	15/33	142/1	30/3	25	7/10	1/46	0/40	16/9	10/102	6/121

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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CHAPTER 6
CONCLUSION

The Proposed Action is likely to adversely affect the Mariana fruit bat, Mariana crow, Guam rail, and Guam Micronesian kingfisher on Guam although this loss will not preclude the recovery or survival of these species. The DON has proposed several conservation measures to benefit these species and BMPs to proactively reduce, minimize, or avoid impacts (Table 2-1 and Table 2-2).

The BMPs will be implemented as appropriate for the individual construction projects. For example, HACCP plans will be required for all projects involving the shipment of materials, supplies or equipment to Guam however, only projects adjacent to recovery habitat will require monitoring to evaluate effectiveness of HACCP.

Implementation of the Conservation Measures will be based on the implementation of the action that results in an impact to recovery habitat. Table 6-1 identifies the elements of the Proposed Action that will result in impacts to recovery habitat. Appendix A is an expanded version of the table that details the various projects covered under the larger Project Description categories. The impacts to recovery habitat are calculated for the species with recovery habitat information. The recovery habitat for one species may overlap with another species. The DON is conducting forest enhancement on up to 1,072 acres of recovery habitat. As mentioned in Chapter 2, the Proposed Action involves horizontal construction work (U&SI). Once the U&SI site work or a development project (Appendix A) is initiated, a commensurate amount of forest enhancement would begin. If the associated vertical construction was never constructed, the forest enhancement would still be conducted as the impact to the resource resulted from the U&SI project.

Conservation Measures such as the Regional Biosecurity Plan, Brown Treesnake research and suppression, Brown Treesnake interdiction at the commercial ports have already been initiated as part of the 2010 BO and will continue until completed as specified in Section 2.4. The DON has developed the material for the sea turtle outreach and will distribute the activity booklets, posters and tri-fold brochures when the USMC population arrives on Guam. The bracing of the Serianthes would be initiated during the construction of the NWF LFTRC.

Table 6-1. Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas Project Name	Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery Habitat (Ac)
FEIS 2010 ROD Related Actions	48.40	75.61	382.93	71.84
Cantonment U&SI Phase I	334.52	336.95	192.73	336.95
Cantonment U&SI Phase II	106.84	106.80	66.34	106.80
Family Housing at AAFB	10.84	10.84	39.73	8.18
Information Technology/Communications	18.51	23.66	96.86	23.46
Electrical, Wastewater, and Water Off Site Utilities	18.79	29.94	67.65	28.35
Water Well Development Area	90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG	62.63	80.50	27.05	80.50
Live Fire Training Range Complex - KD Ranges	115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation	2.88	13.04	0.00	14.42
AAFB – Expand Middle School	0.00	0.00	0.00	0.00
Guam High School Expansion	0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects	138.31	197.32	144.42	197.32
Related Actions and DSEIS 2014 Project Footprints	**933**	**1072**	**1071**	**1065**

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(/2014); Guam Rainbow Chart 3/17/2014

Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90 ac of Impact

The DON has made the determination that the Proposed Action is likely to adversely affect the Mariana fruit bat and its associated recovery habitat. The Proposed Action is also likely to adversely affect the recovery habitat for the Mariana crow, Guam rail and Guam Micronesian kingfisher. A "may affect, not likely to adversely affect determination has been made for the Mariana gray swiftlet, Green sea turtle, Hawksbill sea turtle, and *Serianthes nelsonii* (Table 6-2).

Table 6-2. Threatened and Endangered Species Addressed in this Biological Assessment and Their Affects Determinations

Common Name	Scientific Name	ESA Status	Affects Determination	Critical Habitat
Mariana fruit bat	Pteropus mariannus mariannus	Threatened	Likely to Adversely Affect	Would remain functional to serve the intended conservation role for the species
Mariana crow	Corvus kubaryi	Endangered	Likely to Adversely Affect (habitat only)	Would remain functional to serve the intended conservation role for the species
Guam rail	Gallirallus owstoni	Endangered	Likely to Adversely Affect (habitat only)	Not applicable
Guam Micronesian kingfisher	Todiramphus [=Halcyon] cinnamominus cinnamominus	Endangered	Likely to Adversely Affect (habitat only)	Would remain functional to serve the intended conservation role for the species
Green sea turtle	Chelonia mydas	Threatened	May Affect, Not Likely to Adversely Affect	Not applicable
Hawksbill sea turtle	Eretmochelys imbricata	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Hayun lagu	Serianthes nelsonii	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Mariana gray swiftlet	Aerodramus vanikorensis bartschi	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable

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CHAPTER 7
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APPENDIX A

Expanded Version of the Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas		Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery
Project Name	Overlap - Project Name				
FEIS 2010 ROD Related Actions		48.40	75.61	382.93	71.84
	DSEIS 2014 Project Areas	6.96	9.66	50.42	9.26
Cantonment U&SI Phase I		334.52	336.95	192.73	336.95
	3rd MEB CE/MEB Enablers	4.85	4.85	1.59	4.85
	4th Marined Reg Fac	6.27	6.27	1.62	6.27
	4th Marines Reg HQ/CLB-4 HQ/Dental Co Admin	0.35	0.35	13.21	0.35
	9th ESB EOD/Base EOD/CLB4 Facilities	35.54	35.54	3.29	35.54
	9th ESB HQ	2.51	2.51	0.00	2.51
	9th ESB (-)	3.57	3.57	0.00	3.57
	Auditorium/Theater	1.46	1.46	0.54	1.46
	BASE - Bank & Credit Union	1.48	1.48	0.00	1.48
	BASE - MWD Kennel	1.95	1.95	0.00	1.95
	Base Admin & Comm	6.04	6.04	0.70	6.04
	Base Auto Shop	0.00	0.00	0.00	0.00
	Pub Wrks/Maint Shops	0.00	0.00	0.00	0.00
	Battle Sim Center	0.00	0.00	4.97	0.00
	BEQs (1 Building)	2.68	2.68	0.58	2.68
	BEQs (1 Building)	4.12	4.12	0.00	4.12
	BEQs (1 Building)	2.95	2.95	0.00	2.95
	BEQs (1 Building)	3.02	3.02	0.55	3.02
	BEQs (2 Buildings)	3.18	3.18	2.89	3.18
	BEQs (2 Buildings)	8.47	8.47	0.00	8.47
	BOQ (1 Building)	3.57	3.57	1.49	3.57
	BOQ (1 Building)	1.59	1.59	2.47	1.59
	BOQ (1 Building)	2.54	2.54	0.01	2.54
	BOQ (1 Building)	2.10	2.10	0.04	2.10
	BSTF	0.00	0.00	5.71	0.00
	Central Fueling Station	2.75	2.75	0.03	2.75
	Consolidated Armory	0.08	0.08	1.80	0.08
	Consolidated Club	1.01	1.01	0.49	1.01
	Corrosion Control	7.90	7.90	1.58	7.90
	Education Center	1.29	1.29	1.35	1.29
	Enlisted Dining Facility	1.30	1.30	5.19	1.30
	Exchange Retail Store	4.52	4.52	0.18	4.52
	Fire Station	3.48	3.48	0.00	3.48
	Fitness Center	3.44	3.44	0.86	3.44
	GCE - Inf BN 1 Facilities & HQ	5.94	5.94	1.28	5.94
	GCE - Inf BN 2 Facilities & HQ	0.00	0.00	3.04	0.00
	Law Enf Bn	4.83	4.83	0.00	4.83
	Med/ Den Clinic	1.87	1.87	0.00	1.87
	Outdoor Playing Fields	9.89	9.89	2.96	9.89

	Parking Area (360 Spaces)	1.51	1.51	0.00	1.51
	PEI Warehouse	4.85	4.85	2.05	4.85
	Recreation Center	0.67	0.67	0.16	0.67
	Rel Min Services	2.25	2.25	0.00	2.25
	Sec Bldg/Police Station	4.33	4.33	0.00	4.33
	Transient Quarters	2.00	2.00	1.16	2.00
Cantonment U&SI Phase II		106.84	106.80	66.34	106.80
	9th ESB (-)	1.71	1.71	0.00	1.71
	Artillery Battery	6.38	6.38	2.29	6.38
	Base Warehouse	4.89	4.89	1.83	4.89
	Central Issue Facility	5.11	5.11	0.00	5.11
	Dist Warehouse	7.56	7.56	0.00	7.56
	Ind Combat Skills Training & PLT Battle Course & Gas Chamber	2.93	2.93	6.84	2.93
	GCE Centralized Vehicle Wash Facility	7.05	7.05	0.00	7.05
	GCE - Inf BN 1 Facilities & HQ	8.28	8.28	1.10	8.28
	GCE - Inf BN 2 Facilities & HQ	0.00	0.00	4.52	0.00
	Pass & ID Office	2.44	2.44	0.00	2.44
	Parking Area (360 Spaces)	2.62	2.62	0.00	2.62
	Recycle Center	1.34	1.34	0	1.34
Family Housing at AAFB		10.84	10.84	39.73	8.18
Information Technology/Communications		18.51	23.66	96.86	23.46
	Cantonment U&SI Phase I	0.14	0.14	5.90	0.14
	Cantonment U&SI Phase II	0.03	0.03	0.08	0.03
	Electrical, Wastewater, and Water Off Site Utilities	3.09	4.41	15.89	4.37
Electrical, Wastewater, and Water Off Site Utilities		18.79	29.94	67.65	28.35
	Family Housing AAFB	0.00	0.00	0.09	0.00
Water Well Development Area		90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG		62.63	80.50	27.05	80.50
	Live Fire Training Range Complex - KD Ranges	4.75	13.43	12.34	13.43
Live Fire Training Range Complex - KD Ranges		115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation		2.88	13.04	0.00	14.42
AAFB - Expand Middle School		0.00	0.00	0.00	0.00
Guam High School Expansion		0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects		138.31	197.32	144.42	197.32
TOTAL RECOVERY HABITAT IMPACT - FEIS 2010 ROD Related Actions and DSEIS 2014 Project Footprints		**933**	**1072**	**1071**	**1065**

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(/2014); Guam Rainbow Chart 3/17/2014

Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90Ac of impact

APPENDIX B

36 Wing Instruction 32-7004, *Brown Tree Snake Control Plan*

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

36WGI32-7004

BY ORDER OF THE COMMANDER, 36TH WING

36 WG INSTRUCTION 32-7004

DATE: 15 March 2006

Civil Engineering

BROWN TREE SNAKE MANAGEMENT

OPR: 36 CES/CES (Jonathan Wald)

Certified by: 36 CES/DCE (Merlin J. Miller)

Pages: 16/Distribution: F

This instruction implements the ***Brown Tree Snake Control Plan*** prepared under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, the ***Brown Tree Snake (BTS) Control and Interdiction Plan (COMNAVMARIANAS INSTRUCTION 5090.10)*** dated June 2000, and the ***Brown Tree Snake Control and Eradication Act of 2004*** (Public Law 108-384, 108th Congress). The purpose of this instruction is to establish procedures and guidelines to prevent the spread of Brown Tree Snake (BTS) to areas where it is not already established via the AAFB transportation network. It outlines the procedures for cooperative interagency efforts to control and interdict BTS, including Department of Defense (DoD) coordination, support, and documentation of inspections of outgoing aircraft and cargo by United States Department of Agriculture Wildlife Services (USDA WS) personnel. This instruction applies to all personnel assigned, attached, or associated with the 36th Wing (36 WG), its tenant units, and contractors. This publication also applies to US Air Force Reserve and Air National Guard units and other organizations/tenants associated with or residing on Andersen AFB.

Chapter 1

PROGRAM REQUIREMENTS

1.1. Purpose of Program. Brown Tree Snake (BTS) control and interdiction efforts on Andersen are aimed at reducing the risk of dispersal of the BTS, an invasive species causing extensive damage to Guam's ecology, from Guam via the base's transportation network, as well as addressing ongoing and potential BTS threats to biological resources and human health and safety.

1.2. General Roles and Responsibilities. A Memorandum of Agreement, signed by the United States Departments of Defense, Interior, Agriculture, and Transportation, as well as the State of Hawaii, the Government of Guam, and the Commonwealth of the Northern Marianas Islands,

establishes the cooperative relationship between all signatories in administering BTS control and research activities.

1.2.1. Interdiction Program Requirements. All shipments by air or sea of material originating from Andersen AFB facilities for military exercise support, day-to-day military cargo and equipment and private contractors will be inspected by USDA WS personnel and/or their trained snake detection canines and properly document the inspection before transport off-island. All aircraft, military or civilian, taking off from Andersen AFB will be inspected by USDA WS to the maximum extent possible.

1.2.2. Oversight. 36 CES/CEV will designate a BTS Management Liaison responsible for administering the program outlined in this instruction and resolving any issues dealing with BTS management on Andersen AFB.

1.2.3. Role of U.S. Department of Agriculture Wildlife Service. Control and interdiction protocols will be practiced on a daily basis by private sector contractors and military organizations and/or personnel from Guam's USDA WS, which is the primary federal agency responsible for ensuring the BTS does not leave the island of Guam. USDA WS works cooperatively with the Department of Defense to implement proactive control measures aimed at preventing BTS dispersal.

1.2.3.1. All aircraft and cargo destined for off-island locations have a 100% requirement for BTS inspection. USDA WS personnel require a minimum of 2 hours' notice for inspections and will have detector canine teams available 24/7.

1.2.4. Role of Department of Defense. Andersen personnel involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs will:

1.2.4.1. Plan, direct, and coordinate all cargo handling procedures for cargo departing Guam with consideration for the on-going threat to the Pacific spread of BTS. Cargo handlers and/or managers will work closely with USDA WS personnel to establish and maintain effective cargo and equipment BTS inspection processes. The agency responsible for the BTS inspection or staging area will coordinate for and provide area lighting when needed.

1.2.4.2. Fully cooperate with USDA WS to conduct measures necessary to reduce the BTS snake population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as prey base reduction, exclusion, habitat modification, and capture.

1.2.4.3. Provide USDA WS with adequate forward notification of cargo movements that are not part of typical daily operations, as outlined in the corresponding chapters of this instruction, and assist them as necessary to facilitate the timely completion of the mandatory inspection process.

1.2.4.4. As part of major exercise planning, address BTS control and interdiction procedures in the exercise plan's AF Form 813, Request for Environmental Impact Analysis, in consultation with USDA WS.

1.2.5. Education and Awareness Requirements. The 36 CES/CEV BTS Management Liaison will coordinate closely with USDA WS to obtain and disseminate materials related to BTS education and awareness. Units involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs at Andersen will:

1.2.5.1. Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings (Attachment 1).

1.2.5.2. Conduct information briefings for both permanently assigned and transient personnel based on materials provided by 36 CES/CEV and USDA WS. Explain the potential for impacts if BTS were transported from Guam in military vehicles, cargo and equipment. Explain individual responsibilities if and when a BTS is sighted (kill/capture/immediately report to USDA WS). Use the BTS Awareness instructional videotapes and printed materials, requesting USDA WS participation and/or demonstrations at the briefings when their workloads permit.

1.2.5.3. Provide information cards to personnel as a reminder of the threat and responsibilities for immediate action.

1.2.5.4. Clearly display BTS identification and information posters in tent cities, dormitories, and work sites.

Chapter 2

OUTBOUND AIRCRAFT INSPECTION PROCEDURES

2.1. Requirements. Aircraft departing for off-island destinations are required to undergo 100% BTS inspections by USDA WS personnel with detector canines. USDA WS requires a minimum of 2 hours' notice in order to conduct an aircraft inspection.

2.2. Exemptions. Aircraft flying local missions that are not scheduled to land off-island are exempt from USDA WS inspection.

2.2.1. Since the BTS is nocturnal, quick-turn aircraft that remain on the ground less than 3 hours during daylight do not require BTS inspection.

2.2.2. Commercial aircraft that remain on the ground less than 3 hours during night time (any time on the ground between official sunset and sunrise) will undergo a visual BTS inspection. Commercial aircraft remaining longer than 3 hours will be prepared for a canine inspection. If a canine inspection occurs, the APUs on commercial aircraft will be off.

2.2.3. Urgent missions, such as MEDEVAC, will not be delayed in order to accomplish a BTS inspection. However, every effort will be made to conduct inspections on these aircraft prior to their scheduled departures.

2.3. Incoming Aircrew Notifications. 36 OSS will publish the following notification of BTS inspection requirements in the appropriate Flight Information Publications: "All aircraft departing Andersen AFB are required to have a brown tree snake inspection conducted by USDA WS. Changes in scheduled departure times require three hours' prior notice to ensure timely accomplishment of this inspection."

2.3.1. 36 OSS will require military aircrews with off-island destinations to file their flight plans no later than 3 hours prior to the desired departure time in order to provide enough response time to the USDA WS.

2.3.2. 36 OSS will relay BTS inspection requirements to deployed units during the "Local Area Knowledge" briefing.

2.4. USDA Notifications. Airfield Management (36 OSS/OSAM) will make a printed copy of the consolidated daily flying schedule available to USDA WS no later than 0600 each day. Failure to provide more than 2 hours' notification may result in a stop movement until an inspection can be conducted.

2.4.1. The 734th AMS is responsible for notifying USDA WS of changes to the daily flying schedule for any of the AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.2. The 36 WG Command Post is responsible for notifying USDA WS of changes to the daily flying schedule for any non-AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.3. HSC-25 will coordinate directly with USDA WS to ensure their aircraft with off-island destinations inspected prior to departure.

2.4.4. The 36 OSS will ensure that aircraft inspections are documented in the Access Database upon receipt of an outbound flight-plan. If no inspection is indicated, 36 OSS will coordinate with USDA WS to get the inspection completed. Every effort will be made to avoid departure delays.

2.5. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of each aircraft inspection. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials or name of the USDA WS personnel making the notification.

2.5.1. Database Access. The Access database will be visible to authorized users within the 36 WG Command Post, 36 OSS, Expeditionary Bomb Squadron, Tanker Task Force, and 734th AMS. USDA WS will be provided information from the database upon request to any authorized user.

2.6. Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS, upon a request by USDA WS made either directly or via the 36 WG Command Post, to stop any aircraft from departing Guam that has not been inspected and/or is suspected to harbor BTS.

2.6.1. The 36 OSS personnel who direct the stop movement will inform the 36 OSS/CC or his designated representative. The 36 OSS/CC or his designated representative will ensure 36 EOG/CC is briefed on the incident.

2.7. Aircraft departing without inspection. If an aircraft departs without having a BTS inspection accomplished, USDA WS will contact the appropriate agencies at its destination and inform them.

2.7.1. The 36 WG Command Post will inform the 36 OSS/CC or his designated representative if any aircraft has departed without the appropriate BTS inspection. The 36 OSS/CC or his designated representative will ensure wing leadership is briefed on the incident.

Chapter 3

AERIAL PORT CARGO INSPECTION PROCEDURES

3.1. General Responsibilities and Requirements. Outbound aerial shipments from Andersen include general freight, household goods, and unaccompanied baggage.

3.1.1. The 734th Air Mobility Squadron (AMS) on AAFB handles all outgoing air freight. Containers are delivered to the 734 AMS warehouse area, where they are then palletized, processed, and eventually loaded onto aircraft.

3.2. Routine cargo inspections. Inspections of outgoing air cargo are conducted at the 734 AMS warehouse area.

3.2.1. 734 AMS personnel will inspect all originating boxes for holes, punctures, damage and/or cracks that may permit BTS access and inspect all shipments throughout the selection, palletizing, building and loading process. 734 AMS personnel will handle and stack each sealed box individually while building up pallets.

3.2.1.1. 734 AMS will ensure all personnel receive initial in-depth training on procedures to follow upon spotting a BTS and coordinate with WS for periodic follow-up BTS awareness training sessions. Personnel will remain alert for BTS signs or opportunities at all times.

3.2.2. USDA WS will perform routine sweeps of the 734 AMS warehouse and cargo yard grid three times daily, M-F, and twice daily, Sat-Sun, and maintain a log book in the dispatch area that details their inspection dates and times.

3.3 USDA Notifications. 734 AMS load planners will notify USDA WS when load plans are complete, approximately 4-6 hours before departure. Notification will be either in person if USDA WS personnel are present or by phone when necessary.

3.4. Documentation Requirements. The 734 load planner will annotate the load plan with the time and name of the person notified. Upon completion of the inspection, USDA WS will notify 36 WG Command Post. 36 WG Command Post will update the central inspection database accordingly.

3.5 Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS Commander or his designated representative, upon a request by USDA WS made either directly or via the ATOC, to stop any aircraft from departing Guam with any cargo or equipment that has not been inspected and/or is suspected to harbor BTS. 734 AMS ATOC personnel should notify USDA WS and 36 OSS Airfield Management if cargo about to be loaded onto an aircraft or vehicle has not undergone the appropriate BTS inspection.

Chapter 4

MUNITIONS SHIPMENT INSPECTIONS

4.1. Requirements. Munitions movements typically consist of either break-bulk/uncontainerized or International Organization for Standardization (ISO) container movements that are transported to Kilo Wharf on COMNAVMARIANAS, or those which are loaded directly onto aircraft at Andersen AFB. MUNS will schedule BTS inspections through USDA WS in order to better coordinate any munitions activities going on the same day.

4.2. Break-bulk/uncontainerized munitions:

4.2.1. Munitions pallets will be staged in an area conducive to USDA WS BTS inspections prior to on loading onto trailers for transport to Kilo Wharf.

4.2.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded.

4.2.3. Munitions will not be loaded on trailers which are not ready for immediate transport (within the same day). Munitions that have been exposed to the environment (not sealed in containers) overnight must be re-inspected by USDA WS prior to transport.

4.3. ISO containers:

4.3.1. Munitions will be staged in an area conducive to USDA WS BTS inspections prior to loading into the containers.

4.3.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded into the containers.

4.3.3. Containers not fully loaded, which are to be left unattended overnight, will be sealed after the last USDA WS BTS inspected munitions are loaded into the ISO container. All munitions that were not sealed in containers overnight must be inspected before loading continues on the following day.

4.3.4. Munitions destined for movement via aircraft will be coordinated through the 734 AMS and USDA WS for the BTS inspection prior to loading.

4.4. USDA Notifications. 36 MUNS will attempt to provide an estimated shipping date to USDA a minimum of 30 days out, for most large munitions shipments (i.e. Turbo CADS). Given that this projected date will be tentative, USDA WS will request further updates from MUNS, who will provide a firm target date for all munitions shipments at least 7 days in advance (unless MUNS receives less notice, in which case they will notify USDA WS immediately after learning of the short-notice shipment) and a minimum of 3 hours' notice for any inspections desired on that date.

4.5. Documentation Requirements. 36 MUNS personnel will make an entry in the BTS log located in the crew chief book that identifies the USDA WS inspector for that day's shipment and the approximate time the inspection was conducted, which will then be initialed by the handler conducting the inspection. Before the close of each day in which USDA WS has inspected munitions, USDA WS will coordinate with 36 MUNS to schedule an end-of-day verification of loaded munitions status. At the end of each day, 36 MUNS will make an entry in the BTS log located in the crew chief book verifying that all containers containing munitions packed for shipment have been closed prior to darkness, and the approximate time those containers were closed; USDA WS will authenticate this entry by initialing it.

Chapter 5

TMO SHIPMENTS

5.1. Requirements. Containerized household goods and unaccompanied baggage shipments for Air Force personnel and DOD civilians departing from Andersen AFB, as well as other items scheduled to leave Guam via surface vessel, are managed by Andersen's Transportation Management Office (TMO). When items are shipped by surface vessel, only those containerized prior to transportation to the waterport are addressed by this instruction.

5.1.2. The packing and loading of all household goods at Andersen, including unaccompanied baggage, is accomplished by carriers/local agents before the goods are surface-transported to the port for shipping. USDA WS will promote BTS education and training to local agent/carrier employees.

5.1.3. Items that are of greatest concern are those that have been stored outdoors or in carports and sheds, such as washers, dryers, swing set tubing, lawnmowers, barbeque grills, lumber, pipes, garden hoses, and vehicles. Personnel will be briefed by the TMO that USDA WS will be at the residence to inspect for the presence of BTS.

5.2. Prioritization. Although USDA WS will make every reasonable effort to perform HHG inspections, since HHG are packed at several geographically separated locations simultaneously, USDA WS will prioritize inspections based upon a risk analysis, conducting daily inspections on shipments deemed to pose the largest risk first. Risk factors they consider include packout location, shipment size (shipments of less than 4,000 pounds present a negligible risk), destination (Hawaii and Diego Garcia have the highest priority), and contents (large quantities of goods and equipment stored outdoors carries a higher risk).

5.3. USDA Notifications. TMO will provide USDA WS with a schedule of the upcoming week's HHG packouts and any other container movements every Friday; in addition, they will provide a detailed schedule every day by COB that identifies the type of shipment, carrier, and estimated weight for each of the next day's packouts and container movements.

5.4. Documentation Requirements. USDA WS will make a copy of the weekly schedule and annotate each shipment that was inspected with the inspector's name or initials. USD WS will provide this documentation to TMO ten (10) days later (the following Monday). TMO will maintain these documents on file for at least one year after completion.

5.5. Outbound Privately Owned Vehicles. A significant component of the PCS movement process, personally-owned vehicles (POVs) are handled through a single facility at COMNAVMARIANAS. Vehicles departing Guam are not inspected at Andersen.

5.5.1. USDA WS will conduct canine inspections daily (Monday-Friday) on outbound vehicles at the COMNAVMARIANAS POV lot before being packed directly into 20' or 40' containers and trucked to the Commercial Port for loading onboard a civilian cargo ship. If a vehicle is

inspected but not loaded prior to the close of business on a given day, USDA WS will conduct a follow-up inspection the next business day.

Chapter 6

HSC-25 AIRCRAFT INSPECTION PROCEDURES

6.1. Requirements. Since the BTS is nocturnal; maintenance personnel are present on the flight line in large numbers during the daytime; and pre-flight visual inspections are conducted; a morning inspection of HSC-25 aircraft by USDA WS is considered valid for all flights that take off during daylight hours that same day.

6.1.1. USDA WS inspections of HSC-25 aircraft will be conducted daily prior to the beginning of each day's scheduled flights. To the maximum extent possible, inspections will be conducted at a regular, recurring time as agreed upon by HSC-25 and USDA WS. To ensure timeliness and efficiency, only those aircraft identified by HSC-25 Maintenance Control as viable for flight operations will be inspected. The inspection time will be pre-coordinated between HSC-25 and USDA WS personnel and an HSC-25 Plane Captain will accompany the USDA WS inspector during the inspection to ensure the safety of all personnel and aircraft inspection integrity.

6.1.2. During pre- and post-flight inspections, the inspection of all bays and access panels will include a visual check for potential BTS. In addition, maintenance personnel who are servicing aircraft, conducting daily inspections, and troubleshooting maintenance discrepancies will remain vigilant for BTS incursion. At the completion of daily maintenance, maintenance personnel will ensure all intakes are plugged and all door/panels are secured, which should greatly reduce the possibility of nighttime BTS entry.

6.2. Exemptions. Any aircraft flying missions that are not scheduled to touch down off-island are exempt from USDA WS inspection.

6.2.1. Emergency response exemption. Since delaying an immediate launch for SAR or MEDEVAC is potentially life-threatening to the victim(s), HSC-25 will not delay such missions in order to be inspected. HSC-25 is responsible for informing USDA WS of the short-notice mission upon receipt; if the inspection is not conducted, USDA WS is responsible for making any notification to agencies they deem applicable at the intended destination.

6.3. USDA Notifications. HSC-25 will provide USDA WS a Flight Schedule the evening prior to each Fly Day. The Flight Schedule will annotate the BTS Inspection Time as coordinated between HSC-25 and USDA WS, as well as any known missions that will require HSC-25 to put wheels down anywhere other than Guam soil.

6.3.1. HSC-25 will notify USDA WS of any changes to this schedule when they involve an aircraft taking off during the hours of darkness, at the earliest opportunity once HSC-25 is aware of the change. HSC-25 will also notify USDA WS of any short-notice/emergency flights that would normally require inspection as soon as feasible, but will not delay an emergency response in order to receive an inspection.

6.3.1. **Cargo Inspection Notifications.** HSC-25 routinely moves cargo for NSWU-1, EODMU-5 and MSS-7, as well as MSC and AF SFS. Any unit transporting cargo via HSC-25 is responsible for clearing their own cargo through USDA WS prior to it being transported to or by HSC-25.

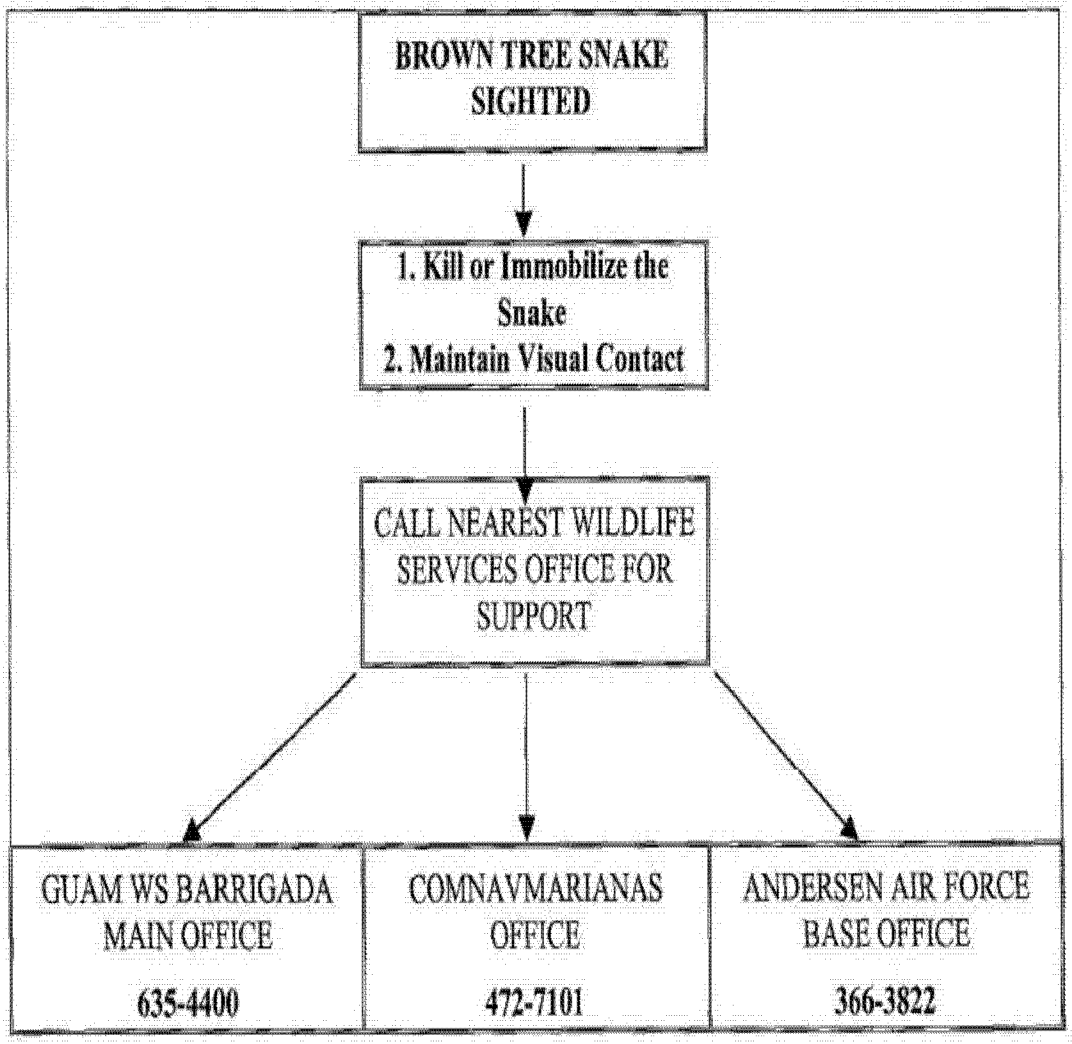
6.3.2. HSC-25 will inform units making requests for cargo transportation of the USDA WS inspection requirement. Units are responsible for notifying USDA WS of the cargo location and estimated pickup time NLT 3 hours prior to the intended pickup time.

6.3.3. HSC-25 will also brief USDA WS inspectors of any known cargo transport missions during their morning inspection, to assist USDA WS in making arrangements for an inspection with the unit that owns the cargo.

6.4. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of HSC-25 aircraft inspections, using the tail numbers of inspected aircraft as a reference. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials of the USDA WS personnel making the notification.

MICHAEL R. BOERA, Col, USAF
Commander, 36th Wing

Table 1: BTS Emergency Response Procedures



* This chart refers to brown tree snakes found in cargo and cargo or flightline areas only. If brown tree snakes are found in residential areas there is no need for residents to notify Wildlife Services. Residents can just kill and dispose of the snake.

Attachment 2. BTS Inspection Contact Information.

Subject: USDA Canine Inspection Contact Phone Numbers

Date: March 15, 2006

To: All Cooperators

USDA-Wildlife Services canine inspection hours and contact telephone numbers are listed below. Please take note of the different telephone numbers for locations north and south of the village of Hagatna.

MONDAY-FRIDAY

	North of Hagatna	South of Hagatna
2200 – 0530 hrs:	888-5708	888-5706
0530 – 2200 hrs:	888-5707	888-5705

SATURDAY-SUNDAY
Call 888-5705 or 888-5709 regardless of location.

If no message can be left at the phone numbers listed above, please try to contact our Andersen AFB Team Leader at 888-5713, or Navy Team Leader at 888-5727 to schedule an inspection.

If you have any questions or concerns in regards to this memo, please feel free to contact me at Andersen AFB at 366-3822.

Sincerely,

Jason C. Gibbons
Supervisory Wildlife Biologist
Canine Program Manager, Acting
USDA/APHIS/Wildlife Services, Guam

APPENDIX C

COMNAVMAR Instruction 5090.10A, Brown Tree Snake Control and Interdiction Plan

DEPARTMENT OF THE NAVY
COMMANDER, U.S. NAVAL FORCES MARIANAS
PSC 455, BOX 152
FPO AP 96540-1000

IN REPLY REFER TO
COMNAVMARIANASINST 5090.10A
N45
14 FEB 2005

COMNAVMARIANAS INSTRUCTION 5090.10A

Subj: BROWN TREE SNAKE CONTROL AND INTERDICTION PLAN

Ref. (a) Executive Order 13112, Invasive Species
(b) OPNAVINST 5090.1B
(c) COMNAVMARIANASINST 3500.4

Encl: (1) Brown Tree Snake Control and Interdiction Plan

1. Purpose. To outline specific responsibilities and establish policy for coordination and procedures governing the control and interdiction of brown tree snakes on Navy installations on Guam and during military training within the Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) Area of Responsibility (AOR).

2. Cancellation. COMNAVMARIANASINST 5090.10. This instruction has been changed in its entirety.

3. Scope. This instruction provides guidance and direction to prevent the dispersal of brown tree snakes from Guam to other locales via military sea and air shipments of personnel, equipment, and cargo. Its provisions are applicable to all activities in the COMNAVMARIANAS AOR who directly or indirectly have responsibility for military sea and air shipments. This instruction issues a revised Brown Tree Snake Control and Interdiction Plan that is to be followed during the planning and execution of any movement of military sea and air shipments, including personnel. This instruction applies to Guam Installation Commanders, Major Exercise Commanders, Training Unit Commanders, and all military Flight Crews.

4. Background. Per reference (a), COMNAVMARIANAS is responsible for not causing or promoting the introduction or spread of invasive species in the United States or elsewhere. The brown tree snake is an alien species to the United States, including Guam, whose introduction has caused significant economic and environmental harm; consequently, it is classified as an invasive species. Per reference (b), the Navy is required to ensure military readiness and sustainability while complying with natural resources protection laws, and conserving and managing natural resources in the United States, its territories, and possessions. This dual dynamic of stewardship and readiness is essential for the long-term maintenance of

military and natural resources sustainability. Per reference (c), COMNAVMARIANAS is the controlling and scheduling authority for Navy-owned and controlled training areas and services in the Mariana Islands. The dispersal of brown tree snakes from Guam to other locales is a serious economic and environmental threat. Preventing dispersal of brown tree snakes in military sea and air cargo is a priority for COMNAVMARIANAS.

5. Action

a. The sponsoring office for this order, the Assistant Chief of Staff, Facilities and Environmental (ACOS N4) is responsible for environmental oversight of all actions, including military training, within the COMNAVMARIANAS AOR. The ACOS N4 is responsible for environmental evaluation of potential environmental impacts, determining the measures necessary to protect the environment and preserving the long-term maintenance of military and natural resources sustainability. The ACOS N4 will advise the Commander of any changes in the handling and movement of military sea and air shipment cargo, and any changes in military training constraints necessary to prevent the dispersal of brown tree snakes in military sea and air shipments. The ACOS N4 will work in close coordination with the Assistant Chief of Staff, Operations (ACOS N3).

b. The ACOS N3 is responsible for scheduling and oversight of supplies and port services and operations, and for the scheduling and oversight of training. The ACOS N3 will accomplish all specified requirements described herein.

c. The Assistant Chief of Staff, Ordnance Operations (ACOS N2) is responsible for preparing and staging munitions for shipment from Guam. The ACOS N2 will accomplish all specified requirements described herein.

d. Regional supported activities, including but not limited to, DRMO Guam, NMCB DET Guam, and MSCO Guam will:

(1) Review the Brown Tree Snake Control and Interdiction Plan and identify and incorporate into local plans all necessary control and interdiction measures, and fully cooperate with federal authorities during observations and inspections of equipment and cargo being prepared and staged for shipment from Guam.

(2) Ensure that personnel assigned to preparation and handling of equipment and cargo scheduled for shipment from Guam are knowledgeable and adhere to the information contained in the

Brown Tree Snake Control and Interdiction Plan and directives pertaining to inspection of outbound equipment and cargo.

(3) Comply with the mandatory regulations and direction contained in the Brown Tree Snake Control and Interdiction Plan when preparing equipment and cargo for shipment from Guam.

e. Commanding Officers/Officers-in-Charge of training units will:

(1) Review the Brown Tree Snake Control and Interdiction Plan and identify and incorporate into training plans all necessary control and interdiction measures, and fully cooperate with federal authorities during observations and inspections of equipment and cargo being prepared and staged for shipment from Guam.

(2) Ensure that personnel assigned to preparation and handling of equipment and cargo scheduled for shipment from Guam are knowledgeable and adhere to the information contained in the Brown Tree Snake Control and Interdiction Plan and directives pertaining to inspection of outbound equipment and cargo.

(3) Comply with the mandatory regulations and direction contained in the Brown Tree Snake Control and Interdiction Plan when preparing equipment and cargo for shipment from Guam.

6. Applicability. This order applies to all commands, organizations, units, and activities authorized use of Navy lands and facilities, training areas, and ranges controlled by COMNAVMARIANAS.

7. Certification. Reviewed and approved this date.

/s/

R. A. McNAUGHT
Chief of Staff

Distribution:
USPACOM REP GUAM/CNMI/FSM/ROP//COMNAVMARIANASINST 5216.1V
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14 FEB 2005

BROWN TREE SNAKE CONTROL AND INTERDICTION PLAN

Prepared by:
Commander U.S. Naval Forces Marianas
Facilities & Environment, N45

August 2004

ENCLOSURE (1)

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ACRONYMS and ABBREVIATIONS

AAFB	Andersen Air Force Base
AMSS	AAFB Mobility Support Squadron
APHIS	Animal and Plant Health Inspection Service
BTS	Brown Tree Snake
CECG	Combined Exercise Command Group
CESG	Combined Exercise Support Group
CNMI	Commonwealth of the Northern Mariana Islands
COMNAVMARIANAS	Commander, Naval Forces Marianas
GDAWR	Guam Division of Aquatic and Wildlife Resources
DLNR	Department of Land and Natural Resources
DOD	U.S. Department of Defense
DOI	U.S. Department of Interior
FISC	Fleet Industrial Supply Center
GovGuam	Government of Guam
HDOA	Hawaii Department of Agriculture
MI	Military Inspector
MILVAN	Military (cargo) Van
MOA	Memorandum of Agreement
PHNSY	Pearl Harbor Naval Shipyard
PM	Pest Management (USAF)
PMRF	Pacific Missile Range Facility
USAF	United States Air Force
USAG-HI	United States Army Garrison, Hawaii
USARPAC	United States Army, Pacific
USCOMPAC	Commander, U.S. Pacific Command
USCOMPAC REP	USCOMPAC Representative
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS/CSU	U.S. Geological Survey/Colorado State University, Brown Treesnake Project
USGS/RRT	U.S. Geological Survey, Rapid Response Team
WACSA	USDA-WS Approved Cargo Staging Area
WS	(USDA) Wildlife Services

BROWN TREE SNAKE
CONTROL AND INTERDICTION PLAN

I. INTRODUCTION

Purpose

Control and interdiction of the brown tree snake (*Boiga irregularis*), hereafter referred to as BTS, is absolutely essential to prevent the dispersal of BTS from Guam to other locales via military sea and air shipments of personnel, equipment and cargo. The control and interdiction protocols are practiced on a daily basis by military organizations permanently stationed in Guam. The purpose of this plan is to disseminate these procedures to resident and transient organizations, and to emphasize the threat and need to prevent BTS movement from Guam to other areas at risk during military training activities. These preventive practices are particularly crucial during shipments to the Commonwealth of the Northern Mariana Islands (CNMI), Hawaii, and other locations where the BTS has no natural population controls. Therefore, the primary objectives of BTS control and interdiction are to reduce the ongoing and potential threats to human health and safety, biological resources, and impacts to island economies.

The Brown Tree Snake Threat

The BTS is a native species of Indonesia, New Guinea, the Solomon Islands, and Australia that was inadvertently introduced in Guam sometime between the mid-1940s and early 1950s. Since its introduction, the population of BTS has expanded to encompass the entire island's rural and urban areas. The BTS has caused or has been a major factor in the extirpation of most of Guam's native terrestrial vertebrates, including lizards and 9 of 11 endemic/native forest and water birds. In addition, the BTS has caused more than a thousand power outages, preyed on poultry and household pets, and has bitten numerous children.

High densities of snakes occur throughout Guam, and in areas where cargo is loaded for transport by air and sea. BTS characteristics such as being able to survive for long periods of time without food, and habitually seeking out small dark places as refugia, work synergistically to give a higher probability for successfully transporting BTS to other islands/regions. Due to the possibility of sperm storage, a single female BTS can potentially start a population. The potential spread of BTS from Guam via cargo movements is a serious concern due to Guam's role as a trans-Pacific shipping hub and the delicate environments of islands that receive cargo.[1] BTS sightings have been recorded in locations ranging from - Oahu in Hawaii, Tinian, Rota, and Saipan in the CNMI, Marshall Islands, Okinawa, Diego Garcia, Wake Island, Spain, Alaska and Texas. There is no documentation supporting any established populations of BTS in any of these locations. However, detecting BTS populations at low densities is extremely difficult.

[1] USDA et al.1996. *Environmental Assessment for Brown Tree Snake Control Activities on Guam.*

II. FEDERAL AUTHORITY AND DIRECTION

1990: Federal funding for BTS interdiction and control initiated.

1990: U.S. Congress incorporated specific direction into the Nonindigenous Aquatic Nuisance Prevention and Control Act regarding the control of BTS in coordination with regional, territorial, state, and local entities in Guam and other areas where the species is established outside of its historic range.

1993: A 5 year Memorandum of Agreement (MOA) between U.S. Department of Agriculture (USDA)[2], the U.S Department of the Interior (DOI), the U.S. Department of Defense (DOD), the Government of Guam (GovGuam) and the State of Hawaii to coordinate BTS research and establish the USDA Animal Damage Control program.

1996: The Commonwealth of the Northern Mariana Islands (CNMI) added to the 5 year MOA.

1999: Department of Transportation and the Department of Commerce added to 5 year MOA.

1999: President Clinton signed Executive Order 13112, "Invasive Species"[3]. The executive order directed federal agencies to (1) prevent, detect, and respond to control populations of invasive species; (2) to monitor invasive species populations; (3) to provide for restoration of native species and habitation in ecosystems that have been invaded; (4) to conduct research and develop technologies to prevent introduction and to control invasive species; and, (5) to promote public education on invasive species.

III. DOD BTS ACTIONS IN THE MARIANA ISLANDS

BTS contamination can occur during any cargo shipment or personnel scenario. COMNAVMARIANAS and Commanding Officer, 36th Air Base Wing, Andersen Air Force Base, are responsible for carrying out a viable plan to meet a full spectrum of potential BTS cargo contamination at Guam's military ports. COMNAVMARIANAS and 36th ABW are fully supported in these actions by the USDA Wildlife Services (WS).

Other cooperative agencies that support COMNAVMARIANAS and 36th ABW BTS control and interdiction efforts include DOI, U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey/Colorado State University Brown Treesnake Project (USGS/CSU), the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources (GDAWR), the CNMI Department of Land and Natural Resources (DLNR), and the State of Hawaii Department of Agriculture (HDOA).

[2] In 1997, USDA Animal Damage Control (ADC) became the USDA Animal and Plant Health Inspection Services (APHIS) Wildlife Services (WS), and is the office presently responsible for integrated wildlife damage management.

[3] "Invasive species" means a species not native to an ecosystem that does or is likely to cause economic or environmental harm or harm to human health.

The COMNAVMARIANAS BTS Control and Interdiction Plan has been implemented and evaluated during major inter-island exercises, as well as numerous small scale operations and daily operations. The control and interdiction procedures were reevaluated as part of a Commander, U.S. Pacific Command (USCOMPAC) Final Environmental Impact Statement that assessed potential impacts of all military training exercises throughout the Mariana Islands. The lessons learned from these major exercises and the results of other environmental evaluations have been incorporated in this plan. COMNAVMARIANAS sponsors annual reviews of BTS control and interdiction protocols with federal, territorial and commonwealth agencies to evaluate additional lessons learned and new technologies that may be adopted in the Mariana Islands.

IV. RESPONSIBILITIES

The following categorized responsibilities provide a foundation for action by certain agencies or individuals involved with Guam military training exercises and BTS control/interdiction programs. Due to turnover experienced by all military units, the responsibilities relating to BTS threat awareness instruction will often be repetitious to ensure that all persons training in the Mariana Islands are fully knowledgeable of individual and command responsibilities.

A. Guam Installation Commanders

COMNAVMARIANAS and Commander, 36th Air Base Wing are responsible for the conduct of BTS control and interdiction on Navy and USAF installations, respectively, and supported daily by the Guam WS permanent staff assigned to COMNAVMARIANAS and Andersen Air Force Base. The installation commanders are responsible to keep WS informed of activities that will require their support. Specific command responsibilities are as follows:

1. Fully cooperate with WS to conduct measures necessary to reduce the BTS snake population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as exclusion, habitat modification, capture and prey base reduction.

2. Plan, direct, and coordinate all cargo handling procedures for cargo departing Guam with consideration for the on-going threat of the pan-Pacific spread of BTS.

3. Consult with WS to determine the necessity to establish USDA-WS approved cargo staging areas (WACSA).

4. Direct cargo handlers and/or managers to work closely with WS personnel to establish and maintain an effective cargo and equipment BTS inspection process.

5. Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings (see Table 1).

6. Conduct information briefings for both permanently assigned and transient personnel. Explain the potential for impacts if BTS were transported from Guam in military vehicles, cargo and equipment. Explain individual responsibilities if and when a BTS or any other snake species is sighted (kill/capture/immediately report to WS). Other snake species can be dangerous.

7. Clearly display BTS identification and information posters in tent cities, barracks and work sites. Use the BTS Awareness instructional videotapes and printed materials, requesting WS participation and/or demonstrations at the briefings when their workloads permit. Provide information cards to personnel as a reminder of the BTS threat and responsibilities for immediate action.

8. For major exercises, include BTS control and interdiction procedures in the exercise plan's Environmental Awareness Annex. Include in the annex, a copy of the information cards to be distributed to training personnel that will define applicable environmental protective measures, including the BTS protocol.

9. In consultation with WS, direct the sites to be used for tent cities and staging areas for vehicle, cargo pallets and containers, and other equipment.

10. Provide vehicle washing areas and high-pressure wash equipment when needed.

11. Designate areas to be used for inspecting vehicles after they have been cleaned and prior to movement to WACSAs or immediate loading aboard aircraft and/or ships.

12. Provide area lighting at WS approved designated inspection and staging areas.

13. Assist WS to facilitate the mandatory 100 percent inspection of all outbound cargo by detector dog teams.

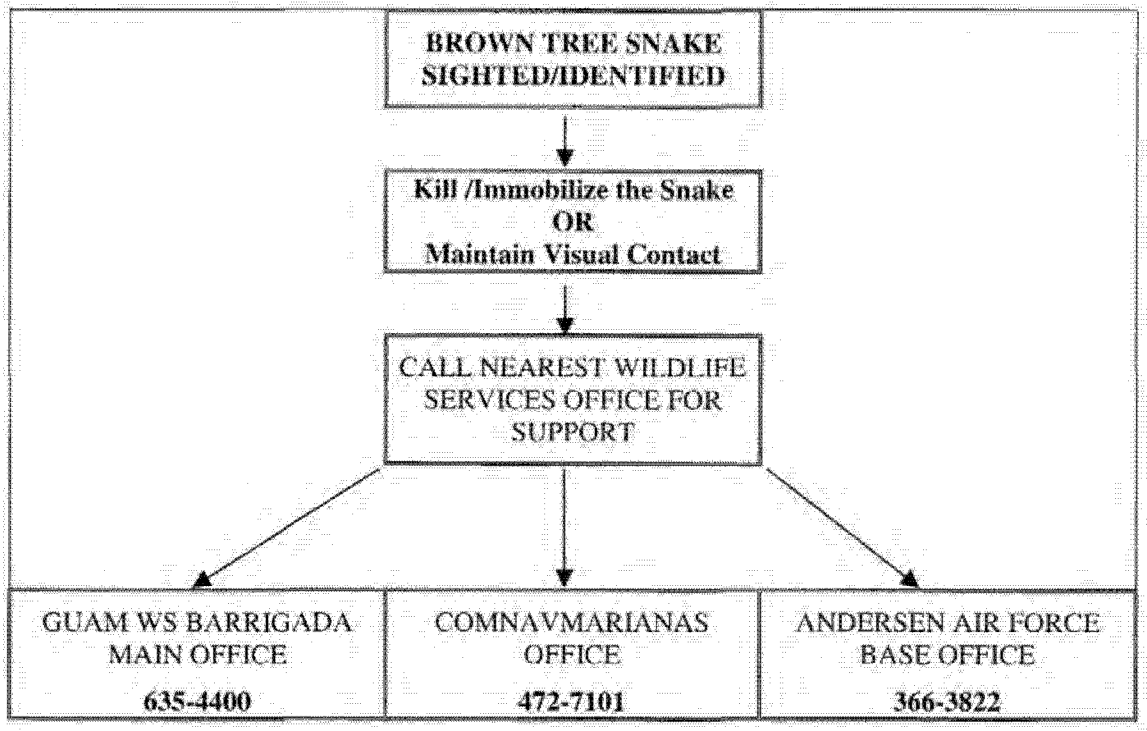
14. For major exercises, assign members of the base environmental staff with experience in conducting BTS protocol as members of the Combined Exercise Command Group (CECG) and the Combined Exercise Support Group (CESG).

15. Provide personnel and logistic support to augment BTS protocol activities as needed.

16. For major exercises and in coordination with WS, enhance rodent control measures and grounds maintenance practices that reduce the potential for BTS activity/presence in areas selected for vehicle and cargo staging.

17. During day-to-day cargo inspections, the installation commander may authorize WS to stop any cargo carrier from departing Guam with any cargo or equipment suspected to harbor BTS.

Table 1: BTS Emergency Response Procedures for Guam Cargo Stations



NOTE: Cellular phone numbers will be provided to exercise units during field exercises to ensure WS can be contacted at any hour.

B. Major Exercise Commanders

The CECG and CESG conducting major exercises are tasked with a variety of responsibilities to support the exercise force. Logistics coordination in response to command direction is the responsibility of the CESG. Early coordination with WS is required to incorporate BTS control and interdiction requirements into the exercise logistic support plans. In regard to BTS control and interdiction, the CECG/CESG will:

1. Work with the Installation Commander and WS when necessary to establish a WACSA for personal and unit equipment, and vehicle staging.

2. Work with the AAFB commander and WS to develop an aircraft parking plan that will minimize potential exposure of aircraft to BTS.

3. Supervise the BTS control and interdiction process by providing environmental monitors as needed.

4. Schedule and monitor BTS control and interdiction briefings for all training units upon arrival.

5. Identify to WS the logistics staff personnel who will be responsible for cargo handling operations and BTS response.

6. Provide WS the authority to stop any cargo carrier from departing Guam with any cargo or equipment suspected to harbor BTS.

C. Training Unit Commanders

Regardless of the size of training exercises, commanders of resident and transient organizations will request support from the Installation Commander (and/or the CECG and CESG) when tasked with establishing tent cities, staging areas, and areas for inspecting personnel, vehicles and cargo prior to shipment from Guam (see Section E below for a listing of WS assistance and service that are provided to training units). The commanders of training units will:

1. Ensure that installation staff or CESG conduct BTS control and interdiction information briefings for exercise personnel.

2. Distribute BTS information packets that include the Emergency Response Protocols in case of actual or suspected snake sightings.

3. Coordinate with the on-site commanders to obtain wash down facilities and inspection areas. 36th ABW may provide portable high-pressure washers and a cleaning area. Future plans include repair of a 36 Transportation Squadron vehicle washing area.

4. Identify key personnel responsible for cargo staging, handling and inspection to the installation commander/CESG and ensure their cooperation with WS personnel.

5. Provide additional information to cargo handlers to increase their levels of BTS awareness. Cargo handlers are the first-line of defense against BTS in military cargo. Request assistance from WS to review the following:

   a. History of BTS on Guam, the threat to the environment, action taken to control and interdict BTS, and the goals of existing programs. (Use the USDA video).

   b. A description of implementation efforts on base.

c. A demonstration by the WS detector dog team.

d. A live BTS to enhance immediate recognition.

e. A review of proper methods to kill or capture the snake.

f. Information cards.

6. Supervise the equipment and vehicle cleaning and inspection prior to moving items to the staging area for WS inspections.

7. Provide WS complete access to staged cargo and equipment, opening any containers as requested for a WS internal inspection.

8. Designate personnel as inspectors to assist during WS and cargo handling personnel during personnel, vehicle, cargo and equipment cleaning and inspection.

9. Ensure that all ships and aircraft departing from Guam for overseas and airports are inspected by WS.

10. Prior to breaking camp and off-island departure, ensure that personal belongings, tents and canvas used/staged in bivouac areas have been inspected for BTS presence by WS. Ensure that all personnel conduct inspections of their individual equipment (hand-carried/back-packed/sea-bags). Request WS assistance prior to breaking camp.

D. Flight Crews

Supporting aircraft may be staged at the AAFB parking apron. Supporting aircraft will not be staged overnight at Orote airfield. When idle, the doors of the aircraft will be closed so that BTS cannot enter the aircraft interior. During pre-flight inspections, flight crews should be alert for potential BTS on aircraft. Request WS assistance as needed.

E. USDA APHIS Wildlife Services Support in Guam

USDA APHIS field operations in Guam are conducted by Wildlife Services (WS) staff consisting of Wildlife Biologists, WS Specialists, and snake detector dogs. Logistic support is available to Guam from the WS staff in Yakima, Washington, who make and store equipment and snake traps.

WS BTS control and interdiction efforts are conducted at all commercial and DOD ports for day-to-day cargo shipments. In support of military exercises, WS inspection and containment efforts are enhanced, and WS will:

1. Conduct a 100 percent canine inspection of all outbound aircraft and surface cargo.

c. A demonstration by the WS detector dog team.

d. A live BTS to enhance immediate recognition.

e. A review of proper methods to kill or capture the snake.

f. Information cards.

6. Supervise the equipment and vehicle cleaning and inspection prior to moving items to the staging area for WS inspections.

7. Provide WS complete access to staged cargo and equipment, opening any containers as requested for a WS internal inspection.

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USDA APHIS field operations in Guam are conducted by Wildlife Services (WS) staff consisting of Wildlife Biologists, WS Specialists, and snake detector dogs. Logistic support is available to Guam from the WS staff in Yakima, Washington, who make and store equipment and snake traps.

WS BTS control and interdiction efforts are conducted at all commercial and DOD ports for day-to-day cargo shipments. In support of military exercises, WS inspection and containment efforts are enhanced, and WS will:

1. Conduct a 100 percent canine inspection of all outbound aircraft and surface cargo.

2. Identify, purchase, operate, and maintain BTS control tools such as snake handling equipment, snake traps, and snake barriers. Barrier fencing is used to erect a WACSA at a port of embarkation on Guam (to keep snakes out of inspected cargo) and a containment area (to keep any snakes in) at the port of debarkation on Tinian. Other tools may be used as needed to accommodate special circumstances and situations.

3. Determine snake-trapping strategies by topographical features and proximity to cargo staging, handling, or processing areas. The BTS trap is a modified minnow trap with a mouse as an attractant within an inner chamber that is inaccessible to snakes. The trap is routinely restocked with food and moisture source for the mouse. The self-setting traps have one-way entrances on either end and are designed for multiple captures.

4. Assign WS personnel and detector dog teams 24 hours/7-days per week during deployment and post-exercise redeployment activities.

5. Use handheld spotlights to walk the perimeter at night to detect and capture BTS, and use detector dog teams to inspect shipments trucked into staging area.

To ensure effective communication with exercise participants, WS will rely on a close working relationship with military cargo managers, appropriate installation commanders, and training unit commanders, and the military commanders keeping WS informed of ongoing and future activities.

USDA WS may be contacted one of three offices on Guam: Andersen AFB Office (366-3822), Barrigada Heights District Office (635-4400), and COMNAVMARIANAS Office (472-7101). The supervisory office in Honolulu can be reached at (808) 861-8576. Cell phone numbers will be published prior to major exercises to ensure WS personnel on Guam and Tinian can be reached 24 hours a day

F. USGS/Colorado State University, Brown Treesnake Project (USGS/CSU)

The U.S. Geological Survey/CSU's Brown Treesnake Project may provide technical assistance to WS. BTS specialists in USGS/CSU may be called upon to provide technical assistance on barrier deployment and construction, trapping efficacy, population levels, special problems with visual or trap-capture of small snakes in dense vegetation, etc. The USGS-Rapid Response Team (RRT) can be requested by local government agencies to respond to any snake sightings outside of Guam.

V. CONTROL, CLEANING, AND INSPECTION PROCEDURES

The possibility of the inadvertent importation of the BTS to other areas of the world is always present whenever military units embark from Guam. BTS is a nocturnal snake that will seek shelter during the day in any area that offers shade, including CONEX boxes, MILVANS, commercial shipping containers, crates, pallets, and personal gear, as well as aboard aircraft, ships, and wheeled or tracked vehicles. The snake can hide in extremely confined spaces. The BTS has the ability to go without food for extended periods and to survive long voyages or flights undetected. Military and commercial air- and sea-ports have recorded several instances of

a live BTS arriving from Guam. Therefore, BTS control and interdiction responsibilities have high priority.

A. BTS Control Measures at COMNAVMARIANAS and AAFB Cargo Points

WS personnel will provide support to the military on a routine basis as well as throughout any training exercises that involve the shipment of military personnel and associated cargo off-island via ship (Apra Harbor) and/or aircraft (Andersen AFB). This support is identified in Section II. D above. Ensuring that the BTS protocol is accomplished and that there are no delays in off-island shipment will require full cooperation from the units being inspected prior to embarkation.

Permanent Staging Areas. Permanent staging areas provided by COMNAVMARIANAS and 36th ABW for sea and air cargo are surrounded by chain link fencing with lighting. These areas are extensively patrolled for BTS but are **not** WS approved cargo staging areas. COMNAVMARIANAS uses Sierra Wharf and warehouse facilities at the former Fleet Industrial Supply Center (FISC). At AAFB, the primary staging area is the 634th Air Mobility Support Squadron (AMSS) warehouse (see Figure 1). Cargo is inspected at these sites daily. These facilities are primarily used for day-to-day cargo staging, but may be used for cargo related to a training exercise.

Temporary USDA-WS Approved Cargo Staging Area (WACSA). When needed to support an influx of training materials and equipment, WS will assist military personnel to select the site for a WACSA for cargo that will be embarked from Guam. In addition to establishing a WACSA at or near a permanent staging area, other paved areas could be suitable.

WACSA will be established when there will be a delay between BTS cargo inspection and movement to the loading point for aircraft or ship embarkation. The WACSA would be used to keep BTS from contaminating inspected cargo and to establish a controlled staging area for snake surveillance and trapping. The necessity to use a WACSA as part of the overall embarkation process will be reviewed during major exercise planning conferences so that the steps and additional time may be included in embarkation plans. The need to use either permanent staging areas or a WACSA at other paved surfaces with low potential for BTS presence will be determined during pre-deployment conferences with WS assistance.

The WS developed WACSA is a barrier constructed with angled sections of weather shade netting on re-bar and PVC pipe supports, weighted along the bottom edge with water snakes and sandbags. The number of entry and exit points is minimized and the barriers at the entrances are designed to lead any BTS toward a trap. The advantage of the temporary barrier is portability and a means to readily support fixed wing operations at main airfields, helicopter operations at landing zones, and ship offloads in port. A temporary snake barrier at AAFB Main or the FISC would be erected 3-5 days prior to the exercise. Snake traps will be placed on the fencing and/or along the forest perimeter. WS personnel will be responsible for trap and portable fence line maintenance, including trap cleaning and the care of mice used as an attractant.

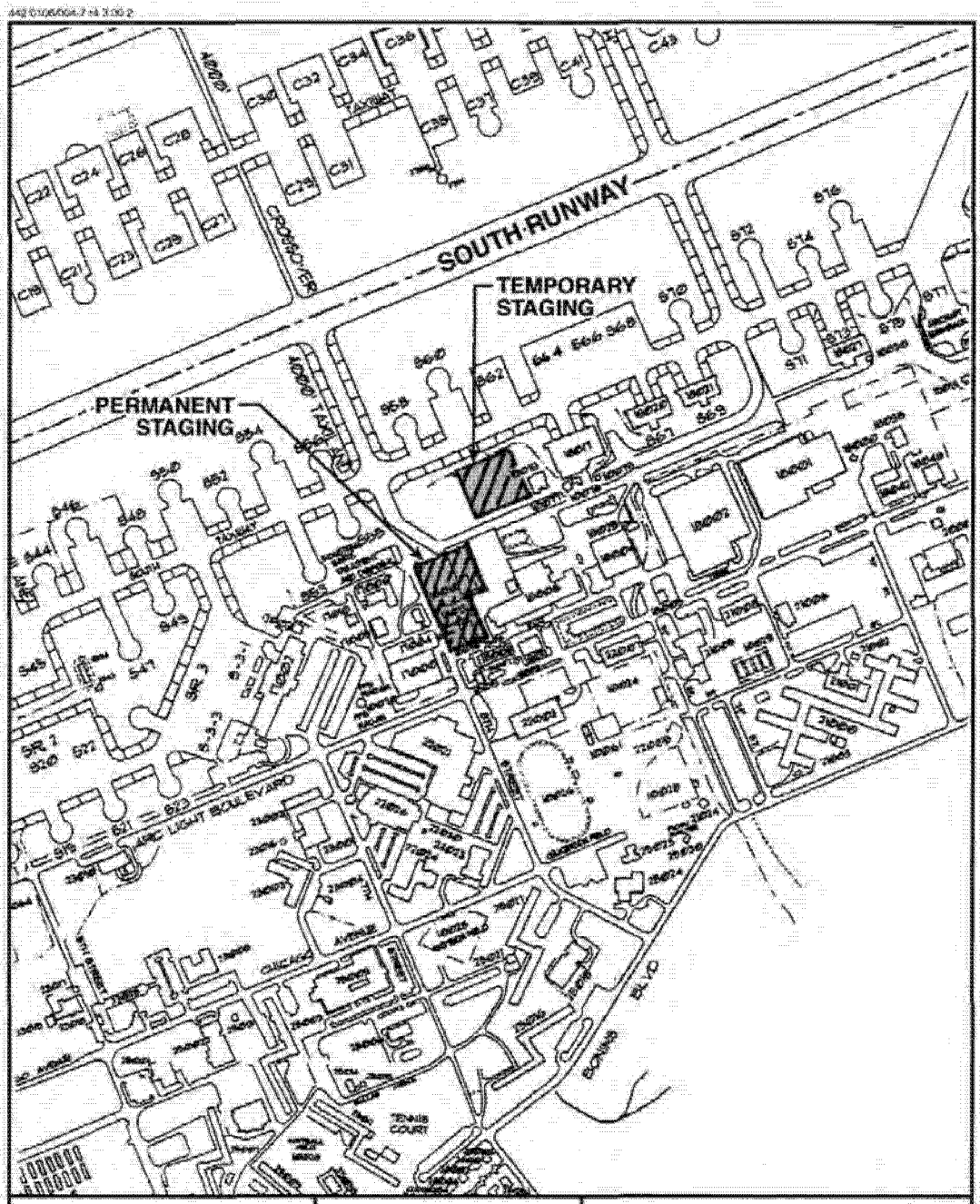


Figure 1
ANDERSEN AIR FORCE BASE
CARGO STAGING AREAS
BTS Control and Interdiction Plan
Belt Collins Hawaii, April 2000

Snake Trapping. Snake trapping is conducted prior to construction of the WACSA on Guam. The time necessary to initiate the effort depends on the selected WACSA site and the nature of the exercise. If the WACSA will be established at AAFB Main and the FISC, snake-trapping activities are already being conducted. If an area elsewhere on Guam, such as Northwest Field, Ordnance Annex, or Orote Point is going to be used, WS will initiate snake trapping thirty days prior to the exercise. Once the WACSA is erected, WS will conduct nightly spotlight searches in the area of the fence to augment area snake trapping.

Detector Dog Teams. WS will use snake detector dogs to inspect outbound cargo and aircraft. The snake detector dog teams (one team equals one dog and handler) will be made available as necessary 24-hours a day, seven days a week.

B. BTS Control Measures at COMNAVMARIANAS and AAFB Tent Cities

Site Selection. WS will be consulted to recommend areas of low BTS risk to be considered as Tent City (bivouac) sites.

Trapping and Searching. WS may elect to activate and monitor brown tree snake traps surrounding the immediate vicinity of tent cities. WS Detector dog teams will periodically walk through the area while troops are being staged prior to departure from Guam. Particular attention to BTS control measures is needed while breaking camp and re-packing tents and equipment susceptible to BTS infestation during bivouac and field training.

C. Cleaning Procedures

Responsibility. Prior to staging in a WACSA and embarkation aboard an aircraft or ship, each training unit will be responsible for cleaning its vehicles and equipment. For vehicles and equipment considered to be high-risk, additional procedures may be required such as high-pressure washing, steam-cleaning, fumigation, or other methods suggested by WS. These additional efforts will supplement any inspection conducted by cargo handlers, unit personnel and WS.

Cleaning Facilities and Equipment. AAFB and COMNAVMARIANAS will provide cleaning areas. If cleaning equipment is unavailable or if the exercise scenario would increase the risk of snake infestation of vehicles, the training units may be tasked with augmenting or providing all necessary cleaning equipment and supplies. To request installation support, training units may contact the following units:

For Andersen Air Force Base: Call Vehicle Operations at 366-2239, 24 hours, 7 days per week.

For COMNAVMARIANAS: Call the COMNAVMARIANAS Area Training Officer (Code N3) 339-6141.

D. Inspection Procedures on Guam

General. The inspection procedure is a joint military/WS effort. It includes individual user and cargo handler attention when packing materials for air and sea embarkation, and a subsequent thorough, systematic inspection of cargo, equipment, and vehicles by WS. To maintain open lines of communication among all involved, DOD will provide WS the names of military contacts at the shipping or air terminals, and WS will keep the military points-of-contact informed of their BTS inspection activities.

WS inspections are required for all outbound cargo. This includes inspections of equipment belonging to units stationed on Guam, and equipment that is transported to Guam by transient units from CONUS, Hawaii, or Japan for subsequent exercise support. Upon completion of the exercise, another inspection is required for equipment that will be cleaned, packed, and embarked for movement to home installations off-island.

Inspecting Personal Equipment. Military commanders are responsible for ensuring that all personal gear, hand-carried equipment and supplies, and tent canvas are visually inspected by military personnel as it is repacked when breaking camp. To facilitate the inspection, personal equipment and tent canvas will be laid out for WS detector dog inspection prior to palletizing or loading into shipping containers.

Inspecting Outbound Cargo. The decisions are based on the nature of the training exercise and volume of cargo to be transported from Guam to an off-island location. The objectives are to minimize the timeline necessary between cleaning and embarking equipment, and to minimize the use of a WACSA without degrading BTS control and interdiction protocols. The military commander and WS cooperate in making these decisions.

Inspecting Transports. The WS Detector Dog Teams may be tasked to inspect accessible transport craft (ship, barge, and/or airplane) prior to departure from Guam.

Inspecting Heavy Equipment and Vehicles. This equipment is often used to support field maneuvers prior to movement to the port of embarkation. WS Detector Dog Teams will inspect all heavy equipment and vehicles after they have been thoroughly cleaned.

Snake Detected or Suspected. If the detector dogs alert to a possible BTS on a vehicle, pallet, or at the threshold of a locked container, the suspected equipment will not be moved. A second detector dog team may be brought on-scene to confirm the first dog alerting to BTS presence. If the BTS is not discovered, the affected military unit will break out the cargo to allow BTS detection and elimination. If the BTS is not immediately found, WS will intensify its search and may activate additional traps in the vicinity of the affected shipment.

All outbound cargo is to be cleaned, inspected and immediately loaded onto a vessel or aircraft. If there is a delay between inspection and loading, cargo may be subject to WS reinspection or be placed in an approved WS cargo staging area. WS will decide on the proper course of action. WS may determine that any ship, barge, boat or aircraft that was inspected and then unattended may require another inspection prior to departure. Cargo, vehicles, and equipment held within a WACSA for an extended period (such as during the night when snakes are active) may be subject to additional inspection prior to loading for departure.

Schedule and Plan Modifications. WS plans its personnel and detector dog team assignments based on published exercise plans, arrival and departure schedules. Sites to be used as WACSA at ports of embarkation and debarkation are selected in advance and activated prior to the exercise commencing. Relocating established WACSA might not be feasible. However, given reasonable time to react, WS may alter its personnel and detector dog team schedules and assigned cargo and vehicle inspection sites. Since the BTS protocols take precedence when executing tactical troop and cargo movements from Guam, the arrival and departure schedules and points-of-contact will be verified by the military so that WS support will be on-hand when expected.

Inspection Verification Process for Tinian Shipments. WS personnel will identify inspected items within Guam containment areas by affixing a stamp and/or tag to cargo or cargo manifest denoting the words "Snake-Inspected" together with date and time the inspection occurred.

WS will be especially watchful to ensure that airdrop cargo for Tinian has been thoroughly inspected and is tagged for identification by CNMI Customs Inspectors.

E. Inspection Procedures on Tinian

Military exercises may involve personnel, cargo, and equipment movement between Guam and Tinian, CNMI. Similar staging and inspection processes for Tinian may be established at other island training sites.

1. Prior to a training exercise commencing on Tinian, WS personnel will identify, purchase, and make arrangements with DOD to transport BTS control and interdiction tools and equipment such as temporary snake barrier components, snake capturing equipment, and lighting. WS personnel will train volunteering wildlife and/or customs officials to assist with BTS interdiction measures

2. Supporting cargo that is shipped to Tinian from Guam in advance of the training exercise is subject to the routine cargo inspection process conducted daily by WS. A WACSA-type barrier may be used at the Tinian harbor, and the cargo will be checked by CNMI Quarantine Inspectors to ensure that BTS inspection was conducted on Guam and the stickers/tags then removed.

3. Prior to arrival of the first military cargo from Guam to Tinian, WS will review the BTS protocol and necessary actions with the on-scene federal and CNMI wildlife and/or quarantine officials. Exercise planning will include designating the following: responsible logistics personnel, cargo offloading and staging areas, and cargo drop zones to be used that will require BTS control measures. WS will conduct BTS surveillance during nighttime cargo offloading, staging, and release of inbound traffic from Guam. WS will coordinate spotlight searches of staging areas, fence lines, and any tree lines/forest areas in proximity to runways/taxiways that are designated as drop zones. These areas will be targeted during inbound and exiting traffic times.

4. The majority of personnel, cargo, and equipment that deploy from Guam to Tinian are air-transported to North Field (preferred) or the West Tinian Airport as part of the military exercise. Prior to arrival, sections of angled weather shading will be used to establish a containment area for offloaded personnel and cargo. The portable barrier will be erected and maintained about five days prior to the first shipment. Prior to the arrival of exercise personnel and cargo, snake traps with a mouse attractant, food and moisture source will be installed in the forest adjacent to the barrier. Snake traps inside the barrier will be a passive design.

5. WS will maintain the BTS traps at the containment area throughout the duration of the training exercise. Some traps will be installed near parachute drop zones and near take-off zones. Additional BTS traps shall be made available for contingency plans and in case BTS sightings occur in the exercise area.

6. An anti-coagulant toxicant (contained within a tamper proof bait box) will be used in and around brown tree snake trapping areas and near cargo containment/temporary snake barriers to reduce local rat populations. Removal of rats reduces the potential damage they inflict to traps and barrier material.

7. CNMI DLNR may provide Snake Detector Dog Teams from Saipan on short notice if BTS presence is suspected.

8. When shipments reach Tinian, CNMI Quarantine Inspectors may check for the BTS inspection stamp/tag that verifies that the inspection process was conducted on Guam. If there is no tag on cargo that originated in Guam, the cargo may be reloaded aboard the aircraft/ship and returned to Guam. The inspection stamp/tags will be removed prior to the cargo being moved out of the containment area or drop zone. It is important that the tags be removed to avoid any confusion when the equipment and vehicles are returned to Guam at the end of the exercise, and subsequently re-inspected prior to transient unit departures to home installations.

9. WS will maintain a log of all cargo, vehicle, equipment, and craft that are inspected and will monitor the time between inspection and movement. CNMI-DLNR staff may request copies of inspection logs and cargo manifests. WS and CNMI DLNR will continue to support inspection and surveillance at Tinian's air and sea ports of entry and exit until military forces have departed and the exercise is formally terminated.

VI. GUIDELINES FOR BTS SIGHTINGS

Emergency Response Procedures are published for COMNAVMARIANAS and Andersen Air Force Base to contact Guam WS immediately (see Table 1). Similar procedures have also been identified for publication at military bases in Hawaii, in case BTS are sighted or suspected in returning shipments. These procedures to obtain immediate support from Hawaii Department of Agriculture and WS are found in Enclosure (2).

A. Immediate Action

1. **Make every attempt to kill or to capture the snake**. Do not delay. The cost and difficulty of trying to locate an escaped BTS coupled with the potentially significant ecological impacts of

each snake justifies the killing or capturing of the snake immediately. If it is not possible to kill or capture the snake, maintain visual contact.

- A BTS can be captured by pinning it down with one's boot heel, a stick or rifle butt, or anything heavy. A sharp blow to the snake's head with the butt of a (unloaded) rifle or boot heel should be fatal.

- A bucket or heavy box can be used to capture a snake on a flat surface. Place the container over the head of the snake leaving enough space for the snake to crawl completely underneath the container. Then weight it down to confine the BTS. If bagging a stunned or pinned-down snake, grab it directly behind its head.

- Keep any dead or captured snake available for positive identification by WS or an Environmental Monitor.

2. **Exercise caution.** When threatened, a BTS will coil back into a strike position, flatten its head, and lunge to bite. Small grooved fangs located in the rear of the mouth enable the mild venom to trickle into the bite while the snake constricts. A normal defensive strike from a BTS will not allow the rear fangs to penetrate the skin and will usually result in minor punctures similar to pinpricks. When wearing battle dress uniforms (BDU) and field boots, a bite from a BTS will not penetrate clothing or footwear. Use caution with all snakes. There is the chance, although unlikely, that other, more dangerous, snakes could be encountered.

B. BTS Sighting on Tinian or Other CNMI Sites

Tinian is a BTS-free island, therefore, killing or capturing a sighted BTS is critical. Reaction to a BTS sighting on Tinian and subsequent incident reporting procedures are the same as described above for sightings on Guam. Staff response during major military training exercises on Tinian may include representatives of CNMI Division of Fish and Wildlife, WS, and/or Navy environmental monitor staffs. All are equipped with cellular phones. The latter will have radio/telephone communication with the CESG.

Exercise caution, safety and discretion. The priority action becomes killing, capturing, or containing the BTS. Report the incident, including the same information as needed for Guam BTS sightings.

The telephone numbers to call are:

CNMI Fish and Wildlife Saipan office:	(670) 664-6011/6000
CNMI Emergency Management Office:	(670) 322-9528/9
CNMI Fish and Wildlife Tinian office:	(670) 433-9298
USGS-RRT:	(671) 777-4477

USDA APHIS WS Guam District Office:	(671) 635-4400
USDA APHIS WS AAFB:	(671) 366-3822
USDA APHIS WS COMNAVMARIANAS	(671) 472-7101

CNMI will dispatch investigating personnel and detector dog team assistance. The WS and Navy Environmental Monitors/CESG will also be notified (via cellular phone numbers provided prior to the exercise).

C. Notifications for BTS Sightings on Guam

When a BTS is sighted, the immediate action is to kill or immobilize the snake so that it cannot escape. The person involved will then collect information of the incident that will describe the circumstances of the sighting, and remain on scene to act as primary POC to other responders. WS may call upon the person who discovered the snake to collect additional information.

1. When a BTS is sighted, killed and/or captured on Guam, or a BTS is suspected to be in a specific area, immediately contact the local area WS office, COMNAVMARIANAS and/or Commander, 36th ABW. The caller will provide the following information regarding BTS presence and will be given instructions regarding follow-on action:

- Caller:
- Military Organization:
- Sighting Location:
- Status: (Snake Killed/Captured/Contained/Loose)
- Date and Time of Sighting:
- Initial Response Action Underway at the Scene:

2. The telephone numbers to call during business hours are:

USDA APHIS WS Guam District Office:	(671) 635-4400
USDA APHIS WS AAFB:	(671) 366-3822
USDA APHIS WS COMNAVMARIANAS	(671) 472-7101

(WS is on call 24 hours per day, and WS field personnel are equipped with cellular telephones. The telephone numbers will be published prior to military exercises).

3. During major exercises, the unit and/or COMNAVMARIANAS will contact the CESG, who will alert exercise personnel needed to respond and the COMNAVMARIANAS Quarterdeck at (671) 339-7133. Cellular telephone numbers will be published prior to major exercises for contact with command Environmental Monitors in the field.

Once notified of a sighting and circumstances, WS will dispatch personnel and/or BTS Detector Dog Teams to the scene. Military personnel will cooperate fully with WS and their inspection of the area, and may provide any assistance needed to locate and capture a BTS.

D. Post-Training Exercise Snake Sighted in Hawaii

The Emergency Response Protocols established for snake sightings at Navy and Marine, Air Force, and Army installations on Oahu are attached as Enclosure (2). The principal state agency that must be informed is the Hawaii Department of Agriculture (HDOA), Plant Quarantine Branch at (808) 586-7378 or 586-PEST.

VII. REFERENCES

Brown Tree Snake Control Committee, Aquatic Nuisance Species Task Force. June 1996. *Brown Tree Snake Control Plan.*

Commander, Amphibious Group One Naval Message 040925Z December 1999, "USS Ogden and USS Rushmore Guam Equipment Washdown 7-13 Nov 99, Consolidated After Action Report of Lessons Learned."

Commander, U.S. Navy Marianas. October 1996. "Brown Tree Snake (BTS) Control/ Interdiction Plan for Military Training Exercises."

United States Department of Agriculture – Animal and Plant Health Inspection Services – Wildlife Services, Program Aid No. 1636, October 1998. "No Escape from Guam: Stopping the Spread of the Brown Tree Snake."

United States Department of Agriculture – Animal and Plant Health Inspection Services – Wildlife Services – National Wildlife Research Center, et al. July 1998. "1998 Brown Tree Snake Research Symposium."

United States Department of Agriculture. June 1996. *Environmental Assessment for Brown Tree Snake Control Activities on Guam.*

United States Department of Interior, Office of Insular Affairs. September 1999. *Integrated Pest Management Approaches to Preventing the Dispersal of the Brown Tree Snake and Controlling Snakes in Other Situations.*

United States Pacific Command. June 1999. Final Environmental Impact Statement, Military Training in the Mariana Islands.

HAWAII EMERGENCY RESPONSE PROTOCOLS

U.S. NAVY

SNAKE SIGHTED ON NAVY PROPERTY

Kill or Immobilize the Snake

Maintain Visual Contact

If Sighting is in or around the Pearl Harbor Naval Complex

Navy Housing, Naval Station, Pearl Harbor Naval Shipyard, Fleet Industrial Supply Center, Naval Intermediate Maintenance Facility, Public Works Center

COMPACFLT, PACDIV, Inactive Ships, and all Navy Commands in the Area:

CALL NAVAL STATION SECURITY POLICE at

471-7114

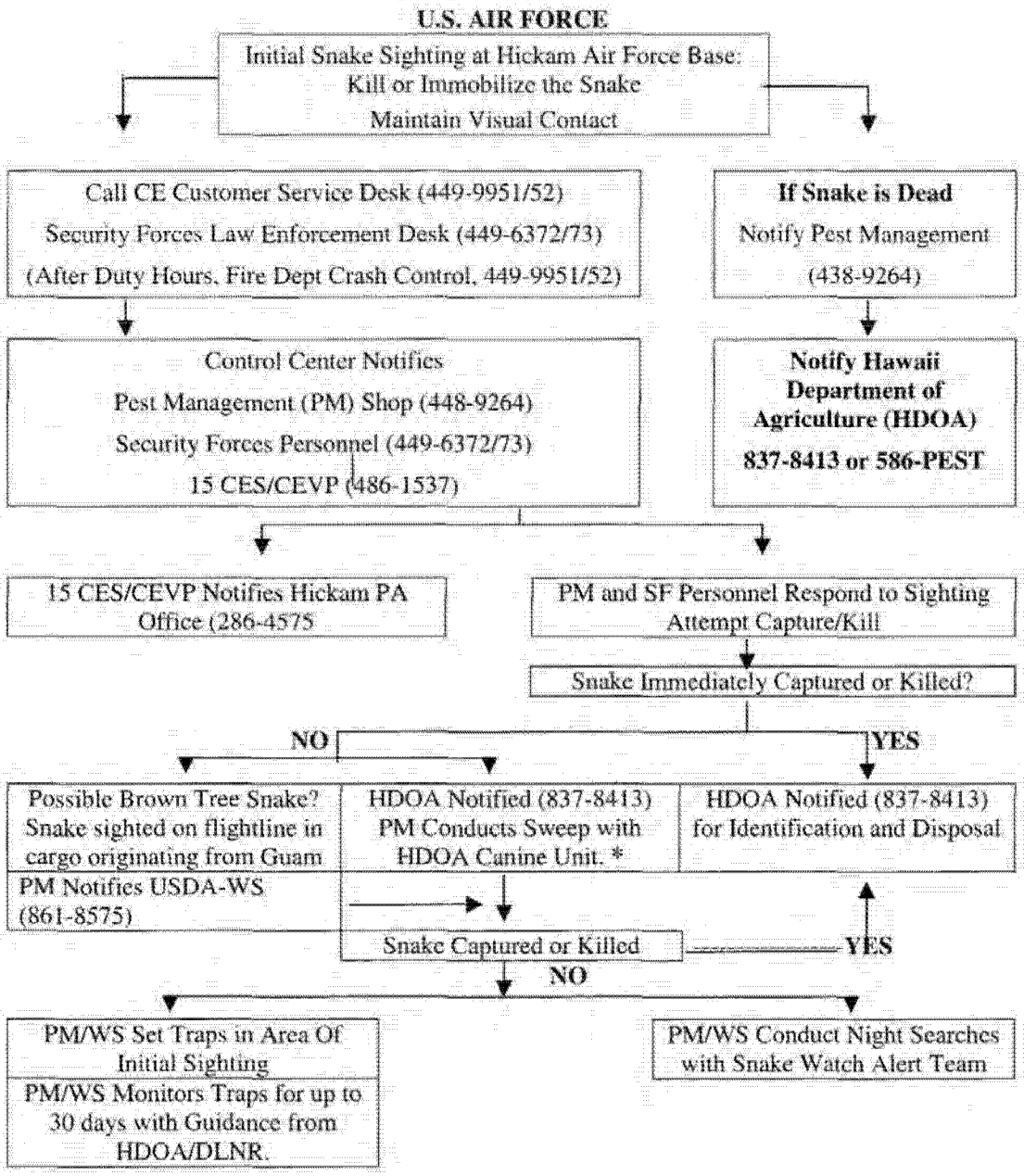
If Sighting is outside the Pearl Harbor Naval Complex

CALL SECURITY POLICE IN THAT AREA

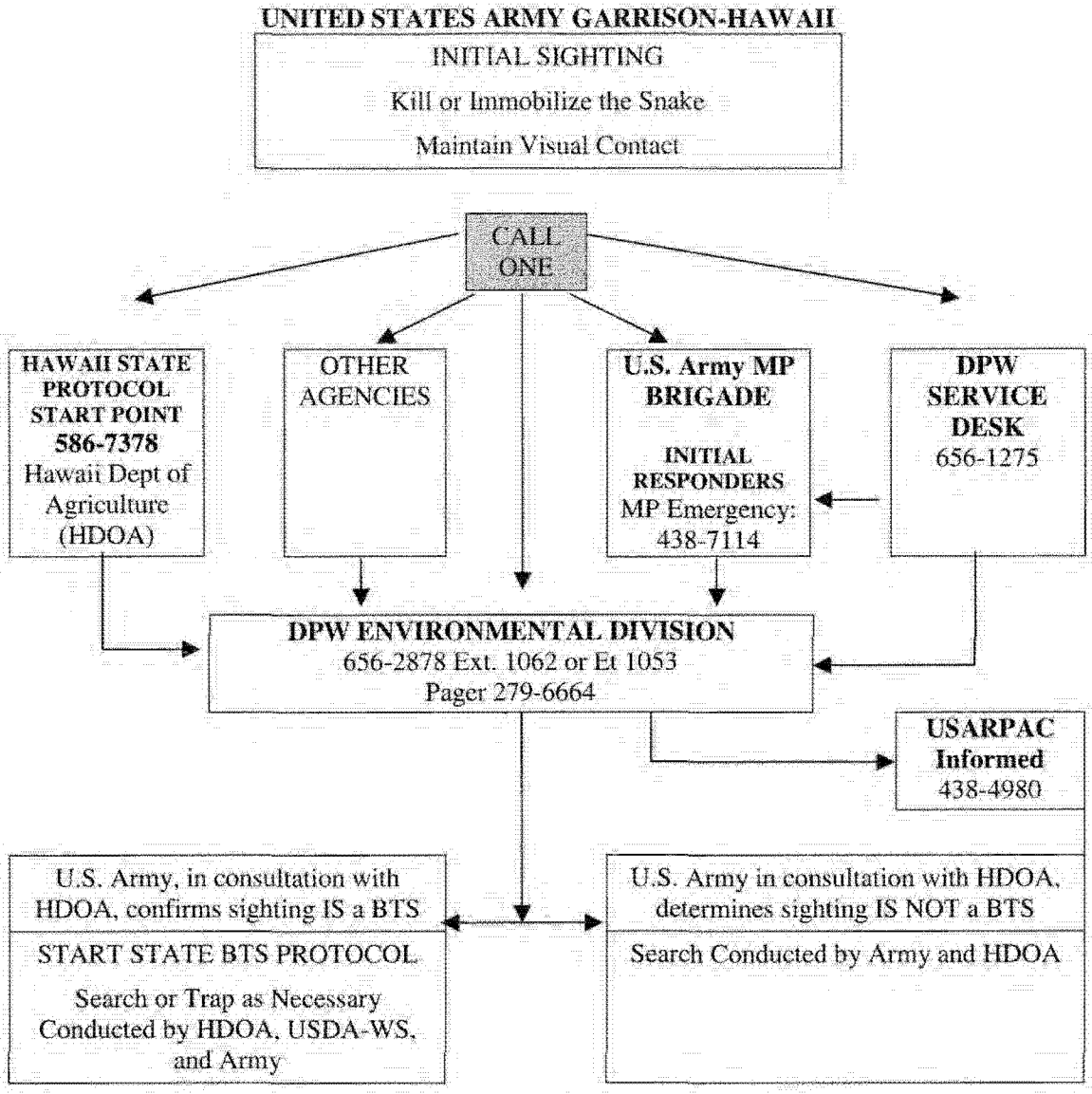
Pacific Missile Range Facility, Kauai	Naval Magazine, Lualualei	Naval Computer and Telecommunications Master Station	Naval Security Group Activity, Kunia
471-6523	668-7114	653-0000	655-3200
471-4185	471-5141	653-0234	655-3205

Area Security Police will provide first response to sighting and inform NAVSTA dispatch at 71-7114 and the Department of Agriculture at 586-7378. First responders will collect information on the snake sighting, if it was killed or captured, and act as the primary POC to others responding to the scene. Security Police are trained in snake response equipment and techniques.

All civilian and military personnel will be briefed on BTS and trained to respond and comply with reporting procedures. The videotape "The Silent Invader" will be shown as part of this training. Training should be recurring. BTS posters will be displayed in buildings to remind personnel of the danger. The reporting number should be changed to the number for that area. For more information, contact the COMNAVBASE Pearl Harbor Regional Conservation Coordinator, at 471-0326, or Environmental Protection Specialist at 471-1171, extension 233. Alternate number is 471-1171, extension 225 (pager number 361-4864).



Notify J431, USCOMPAC at 477-0850 if State and WS activate Emergency Response Team.



If State and WS Emergency Response Team are dispatched to military installations, notify J421, USCOMPAC at 477-0850.

MARINE CORPS BASE HAWAII, KANEOHE BAY